

Arboretum BULLETIN

A JOURNAL OF GENERAL HORTICULTURAL INFORMATION
PUBLISHED QUARTERLY BY THE UNIVERSITY OF WASHINGTON
ARBORETUM FOUNDATION • SEATTLE • WASHINGTON

Fall, 1949

VOLUME XII, NO. 3

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The Arboretum Bulletin

VOLUME XII

FALL, 1949

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Arboreta and Their Relation to the Community and Individual

B. O. MULLIGAN*

Definition

AN arboretum is defined in the dictionary as a place where trees and shrubs are grown for scientific and educational purposes; that may be very briefly and clearly the bare outline purpose of an arboretum but leaves much detail wanting.

In this paper I will try and fill in part of the omitted details and show some of the ways in which such an arboretum as we have in Seattle can be of service to the community and the individual.

Distinction from a Park

As many people, due no doubt to inadequate publicity on our part, believe that an arboretum is only another kind of park and can be used for the same varied purposes, it may be well at once to point out some distinctions between them.

An arboretum may often look very much like a park, except that larger areas may be covered by trees and less by mown grass, there are no facilities for games, and plants often have, or should have, labels with English and Latin names on them. The real key, however, lies in that dictionary definition—"for scien-

tific and educational purposes"—not, as a park, primarily for recreation, with the emphasis chiefly on the physical aspects.

An arboretum should be a museum or collection of living woody plants, comparable in purpose and function with a zoo or aquarium in the animal world, and even exceeding those in some respects, since plants cannot only be seen at the closest quarters but also pulled to pieces for examination in detail if desired, which is something no zoo could even contemplate!

In comparison with a park an arboretum does not permit the same freedom for exercise; it should, however, provide the materials and so arrange them as to stimulate the interest of its visitors in what it has to show, which is, ideally, well-arranged groups or plantings of properly tended trees and shrubs in wide variety to provide beauty of form and color throughout the year, named and labelled for the information of all who want it.

In an arboretum therefore, the plants should be the first consideration, the visiting public the second. How to emphasize that fact with our citizens is one of our as yet unsolved problems.

Use to the Community

From what I have just said the uses and limitations of an arboretum begin to appear. It is not a place for exercise, except by walk-

*This talk presented by our director, Mr. B. O. Mulligan, at a meeting of the International North-West Parks Association, August 12, in Tacoma, Washington, carries such interesting viewpoints that the editorial board of The Bulletin decided to run it in place of his usual Arboretum progress report. Summer activities in the Arboretum will be included in Mr. Mulligan's report in our Winter issue.



ing, nor is it a place for fishing or hunting, whether by men or animals, or for other games, with all of which we, and no doubt other similar institutions have to contend. Proximity to the city certainly is a handicap in various ways and accounts for many of our difficulties both with plants and persons.

Some of the services an arboretum can offer to those living in the area are these. First, to grow as wide a selection of different kinds of trees and shrubs as the climate, soil, and area will allow, in order to demonstrate their characteristics, qualities and uses under local conditions. If space is limited, as it frequently is, then the most ornamental and reliable plants should receive preference over those of less garden value. Cultivation and care should be as good as circumstances will permit, to give the plants opportunity to display their particular features to the best advantage.

Second, to introduce or bring to public notice plants of quality which are either unknown or little grown in the area. An arboretum is in an excellent position to learn about and obtain new or rare plants, whether from botanic gardens, collectors, nurseries, plant breeders or just plain gardeners almost the world over, and many arboreta play a most useful part in this work. Arnold Arboretum, for example, has introduced more than 3,000 plants new to this country in 75 years. It is however, another matter for a good new plant to become well-known and popular, as witness the Beauty-bush (*Kolkwitzia*), Sargent's Cherry (*Prunus Sargentii*), *Viburnum fragrans*, and *Hamamelis mollis*, the Chinese Witch-hazel. In this important work nurserymen should cooperate more closely with arboreta, especially in their own area or with those having a similar climate.

If the arboretum has the necessary funds, staff and facilities, then it may embark on a program of plant breeding and raise its own novelties, as the Arnold Arboretum at Boston is now doing, and to a lesser extent some other institutions, including the Morris Arboretum

at Philadelphia, and the hybrid Azaleas produced by Mr. B. Y. Morrison at the National Arboretum at Washington, D. C.

New plants, whether introduced from abroad or raised at home, require to be tested over a period of several years to prove their worth and discover their qualities, especially of hardiness, flowering or fruiting capacity, and any peculiarities when cultivated. Few nurseries, except perhaps the largest, or institutions other than arboreta, can give space or labor for this work, and it is therefore a service which the latter should aim at giving, perhaps in conjunction with the nursery trade. The testing of various plants for hedges, ground-covers, and other special uses is another particular service of real value to local growers, both professional and amateur, and the sorting of worthy from unworthy varieties amongst Lilacs, Philadelphus, shrubby Honeysuckles, Rhododendrons, Camellias, and many other large groups is becoming more and more necessary.

Third, to be a source of information to the public as to how to obtain, plant, grow, prune, spray and otherwise deal with trees and shrubs of all kinds. This is such a large and comprehensive matter that only a well-equipped office and laboratory staff can handle all queries, but at least the spirit of willing help should be there, and those questions that cannot be answered may be referred to some other competent authority. Such information can of course be distributed in a variety of ways, beginning with the labelling of the plants, by telephone inquiries—our own office answers five or six a day through the year—replies by letter, newspaper publicity (weekly notes to local papers), radio programs on current work topics or particular plant groups in flower, as well as by leaflets, bulletins, or other publications—all of which we use at Seattle. A good library is an essential part of this service, and this we are endeavoring to build up in the arboretum, apart from the University library.

Fourth, arboreta and parks can do much to improve the standard both of planting and plant care in gardens by good examples of both in operation. Promising novelties can be



View north on Boulevard from junction with Interlaken Boulevard, showing new paving and curbs. Tree of White Willow (*Salix alba*) on right.

—Photo by E. F. Marten

very well introduced to the public in this way, by featuring them in prominent sites, whilst more care should obviously be given to establishing plantings along highways and boulevards. Good combinations of plant form and flower color can be worked out, or special plantings made either for effect at one season or for as long a period as possible. One planting in the Arboretum contains both early spring (Forsythias, Camellias, Pieris), late spring (Crab apples, Rhododendrons, Azaleas), early summer (Deutzias, Dogwoods, Cistus, and late summer flowering shrubs (Fuchsias, Hydrangeas, Ceanothus), with fall coloring trees (Pin Oaks) and shrubs for both color and berries (*Photinia villosa* and *Coton-easter Dielsiana*), thus covering a season from March through November. A garden of winter-flowering plants is a project on which we have already made a start; other worth-while garden examples could be formed of Heathers, of evergreens, of plants with golden or grey or fragrant foliage, of moisture-loving or drought-withstanding shrubs, and so on in many variations to give inspiration and improvement to many other gardens.

Fifth, in an organization such as we have at Seattle, and also existing at Berkeley, Boston, Philadelphia, etc., where the arboretum is more or less closely attached to the University, it is obviously a source of material and a place of study for students from botany, forestry and biology departments. Its usefulness in this respect is not of course confined to the University, and thus we find parties of high school and other students coming to see and be taken through the arboretum. More and more do we hope to become in the future a source of enlightenment on trees and shrubs for such groups from schools throughout Seattle and even a wider area, especially as our plantings become more comprehensive, mature and attractive. A lesser interest which we also encourage is ornithology, since the arboretum is used by bird-watchers at several seasons, and harbors an assorted collection of species in its varied territory.

One aspect of the association with schools which should receive more attention whenever

possible is to teach teen-agers in particular the present value of such a city and state asset as an arboretum, and how much more valuable it is likely to become in the future if properly cared for at this early stage and during development towards maturity. We might then by degrees discourage some of the wanton damage done to all such community property by unattended and thoughtless children of varying ages, some of which is serious, some merely annoying, but all unnecessary and taking valuable time to repair.

Not only of course, do visiting groups come to an arboretum but members of the Arboretum staff also go out and give talks to them in their own neighborhoods, usually illustrating these with colored slides of plants growing in the arboretum. At such large and well-established institutions as New York and Brooklyn Botanic Gardens it is evidently a frequent service to groups both in the cities and outside them, and lectures are given by various members of the laboratory or technical staffs on their particular subjects—horticultural, botanical, entomological, or whatever it may be. Here we are as yet too small a unit to extend this service as fully as we should wish, but the need for informative talks is well recognized and a limited number are given through the fall, winter and spring months, especially to garden clubs around Seattle. It is hoped to carry them to a wider audience throughout the state during the coming winter, since it is clear that the functions, extent, and uses of the arboretum are by no means so well-known as they should be, even in the city.

Use to Individuals

Many of the services already mentioned apply as well to individuals as to groups, but more detailed information and advice on a great variety of problems connected with the growing of trees and shrubs in gardens is constantly being given, particularly by phone, but also by letter, especially for the identification of specimens, and personally to visitors. Many of these inquiries concern pests or diseases of woody plants, and it would be an excellent and justifiable step forward if

(Continued on Page 41)

Cornus Arboretum, Cedar Brook Park, Plainfield, New Jersey

HARRIETTE RICE HALLOWAY*

THIS collection is so small and so new as a collection, though not as a planting, that it does not yet seem worthy of the dignity of the title Arboretum and of an article in this BULLETIN. However, the telling about it may encourage others to plant another acorn.

Over twenty years ago a far-seeing member of the Plainfield Garden Club insisted that, in addition to the good things which were being done, money be laid aside to do some one thing of permanent value. Later, concerned about the way bulldozers for road-making and other forms of "progress" were destroying native material, she suggested a dogwood planting along a drive in a county park then being developed in Plainfield.

In the spring of 1931, 85 dogwood trees were so planted—a three to four hundred dollar gift from the club's treasury.

Development was slow—conditions not being ideal. The trees were put in "made ground," in fact the whole park was built on what had been the official city dump, nor was there protection on the northwest from the hot suns of summer and cold winds of winter. The results were not satisfying.

So nine years later, a hundred more trees were added, a second gift of several hundred dollars, extending the planting on both sides of the road.

At the same time the Park Commission set out adequate hemlocks and pines suitably placed to make pleasing backgrounds and to provide the previously lacking protection.

From then on the Avenue began to look like something worth while, but it was still only

a roadside planting of pink and white dogwoods.

The park is a small one—less than a hundred acres—a unit in a county system. The Union County Park Commission is composed of able gentlemen, serving without salary, who are progressive and cooperative to a high degree.

Four years before the first planting of dogwood, the Commission was pleased when the Plainfield Garden Club united with the local Shakespeare Society in establishing a Shakespeare Garden—the Commission supplying the labor—which has been cared for continuously and is today a beautiful as well as interesting place, one of the few in the United States.

In 1932, the year after the first dogwood plantings, it was decided to have an Iris Garden, developing it with the cooperation of members of the American Iris Society. The Garden Club voted to join that project also, the Park Commission again agreeing to supply the labor. This garden also is beautiful and interesting today, one of the best public Iris Gardens in the whole country.

In 1936 and 1939 the chairman who planned and developed the Iris Garden acted in planning and developing a Daffodil Plantation and a Peony Garden, projects of the Park Commission.

These last three paragraphs have been interpolated to explain the confidence which inspired the Park Commission's executive head, Mr. Tracy, to say to members of the Conservation Committee of the Garden Club, "Do you think the members of your club would be interested in developing the dogwood planting into an Arboretum?"

On recommendation of the executive committee, to which the question had been brought, the club voted to accept the invitation and made an initial appropriation of a hundred dollars.

*Miss Harriett Rice Halloway, who was, of course, the Horticultural Chairman responsible for arousing the interest in the establishment of the Cornus Arboretum, could be introduced by many titles, but none so fitting as that used in the Members' Day Program of the New York Botanical Garden, Spring 1948, "a skilled amateur gardener."

Although, as Miss Halloway's own words bear out, this is a slight deviation in our series on important arboreta and botanical gardens, we are placing it as such in this issue from the stimulating angle that all such fascinating beginnings lend their worth to importance.

The chairman of the horticultural committee called a meeting composed of the president, the chairman of the conservation committee, the original inspirer of the dogwood plantings, one of the new (young) members of the club, and last but not least, the head of the horticulture department of the Park Commission, Mr. Carver. To his knowledge, advice, and execution credit is due in greatest measure for the excellent beginnings. Several had studied Bailey and brought lists of suggestions for the first plantings. The original inspirer, Mrs. Thomas Van Boskerck, who was leaving for Seattle to visit her daughter, Mrs. Edwin A. Potter, suggested that perhaps, in exchange for some native varieties from this area, the University of Washington Arboretum might send a young plant of *C. Nuttallii*, and was commissioned to act in any manner she found to be the best, a most fortunate provision. The site was studied and a list made of the first plantings to be put in that autumn, 1946.

Thirteen varieties of *Cornus* went in: *alba elegantissima*, white margined leaves; *alba sibirica*, red or coral bark; *alba Spaethii*, yellow edged leaves; *alternifolia*, in panicles; *Amomum*, red bark, silky leaves; *Baileyi*, red bark; *Kousa*, a large, shapely white flower; *Kousa chinensis*, becomes a small tree with beautiful form; *Mas*, the very early yellow; *paniculata*, gray bark, white flowers; *sanguinea*, blood red twig, yellowish leaf; *stolonifera*, shrub with flowers in panicles; and *stolonifera flaviramea*, yellow twig.

During 1947 nine more varieties were planted, six in April and three in September. Five were tree type, as follows: *florida*, white; *f. pendula*, gray bark, white flowers; *f. rubra*, pink; *f. xanthocarpa*, yellow fruit, and *C. controversa*, red twig, bronze leaf. Four of these were of shrub form: *alba*; *rugosa*, round leaf; *pubescens*, and *sanguinea viridissima*, green twig and leaf.

Only five varieties were added in the spring of 1948 and none in the fall, which is not a good planting time for *Cornus* in this area. These were three of the tree form, two of them named varieties; Rose Valley, pink tinged flowers, and White Cloud; also *florida*

Welchi, gray bark, white margined leaves, and two shrubs: *alba argenteo-marginata*, white margined leaves, and *alba stolonifera*.

During that year there occurred the hoped-for pleasure of exchange with the Arboretum of the University of Washington and the surprise of a present from the Arnold Arboretum. Mr. Mulligan kindly sent to the Park Commission's nursery, four each of seedlings of *Cornus Nuttallii*, and *pubescens variegata*; and accepted from it nine plants—three each of these varieties: *alba sibirica*, *stolonifera flaviramea*, and *paniculata*. Dr. Wyman sent scions—one each of *Cornus Arnoldiana*, *asperifolia*, *australis*, *coloradensis*, *glabrata*, *obliqua* and *Walteri*.

This year, in April, four varieties were put into the collection, the two from Seattle among them—one *Nuttallii*, tree form; two shrubs, *paucinervis* and *pubescens variegata*; and one groundling, *canadensis*.

The young Arboretum now possesses thirty-one varieties—each wearing a metal label stamped with its own correct botanical name. An additional appropriation has been made so that it can continue to grow, even though very slowly, with a few each year.

The shrub types are placed in front of and around the tree types. They are grouped well along the four corners at the location where a side road crosses the main avenue of the established dogwood trees. There was an excellent and interesting showing of bloom this year, and the unusual ones, unusual in colorings of bark, twig, leaf, or all three, were already most attractive.

A goodly number of the *Cornus* family seem to ask very little of mankind even when the latter take them from their native habitat and stick them in arbitrarily chosen places. Properly planted in good soil with adequate humus, and well watered in times of drought, they continue to be beautiful and a joy, if not forever at least for many years.

/ / /

Do you patronize the BULLETIN advertisers? When you buy, say that you saw the ad in THE ARBORETUM BULLETIN!

The Beautiful Cornus Family

MRS. O. B. THORGRIMSON*

IT IS to be regretted that this group of plants, which contains so many garden gems, particularly for the small garden, should be so sparingly and so rarely used. Many small suburban gardens are over-burdened with great out-of-proportion forest trees, which, when purchased, were charming little evergreen shrubs eminently suited for their small niches, but which have long since outgrown their quarters.

Many of the dogwoods are suitable for such gardens, and are equally desirable in larger ones, as well as in the public parks and along the boulevards and highways. In fact, there is a member of this versatile family for almost any situation, as the genus includes plants ranging in size from the creeping bunchberry (*Cornus canadensis*) through shrubs and shrubby trees to our lovely *Cornus Nuttallii*, one of the two largest of the group.

And for every season this *Cornus* family manages to put on an important show. Early spring is ushered in by the pale yellow clustered blossoms of the Cornelian cherry *C. mascula*, or *C. Mas*, followed by the great white corymbs of *C. alternifolia* and by the white magnificence of *C. florida* and *C. Nuttallii*, and in June by the most beautiful of all, *C. Kousa* and *C. Kousa chinensis*. Early also, in the shady woods, blooms the little gem *C. canadensis*.

In late summer and autumn, the leaves of almost all dogwoods assume brilliant autumnal colors with fruits varying in color; red, white, black, blue, and one variety with yellow berries. In the winter the stems of some of the shrubby types take on beautiful red tones; others often growing in close proximity have stems of brilliant yellow.

Many species bloom late enough in the season to escape injury of storms and late frosts,

which so often mar the beauty of Magnolias and other flowering trees.

There are about forty species, all coming from the temperate regions of the Northern hemisphere; in North America, Europe and on into Asia, with the exception of a species reported growing in Peru and another in Bolivia. Choice species come from Eastern China, Korea and Japan. In North America, the dogwoods range from Maine to Florida, westward to the Mississippi Valley. On the Pacific Coast many species, including *C. Nuttallii*, occur from California to British Columbia.

Except for one or two Asiatic species, all have characteristic leaves, set opposite one another. All are hardy except one species coming from the warm regions of China (*C. capitata*) which is evergreen in our climate, dropping its leaves in early spring. The leaves are probably more persistent in warmer climates. *C. Nuttallii* will not withstand the rigors of the midwest or eastern climate.

Dogwoods will succeed in almost any soil, provided it is well drained. However, they prefer an acid soil 6-6.5 pH., sandy in texture, with plenty of organic matter incorporated. Planting them with rhododendrons and azaleas, with tall hardwoods such as oaks, hickories and tulip trees forming a light shade overhead, makes a perfect grouping for a woodland garden.

Dogwoods are easily propagated by means of seed, by softwood and hardwood cuttings, by layering, and by grafting into seedlings of the type. Varieties like the pink flowered, double flowered and the weeping dogwood, can be reproduced only by budding or grafting.

The wood of the dogwood is white and fine-grained and has been noted in all ages for its hardness and durability. Both Homer and Virgil mention the use of *C. Mas* as shafts for javelins and Pliny informs us that it was nearly equal to iron in hardness and was used

*It is always a pleasure to present an article under the "by line" of Mrs. O. B. Thorgrimson. Not only is Mrs. Thorgrimson most conscientious in her work as joint editor of The Bulletin and in gathering other authors unto its pages, but graciously finds time, in between, to write with exceptional authority herself.

by the Romans for making wedges, pins and the spokes of wheels.

The wood of *C. florida* is used in the south, where it is so plentiful, for many purposes, such as spools, bobbins, tool handles, mauls, wedges, ladder rungs, in fact, any place where hard durable wood is needed.

The *Cornus* genus falls roughly or naturally into two groups. The first, which includes by far the greatest number of the species and varieties, are mostly shrubby and have flowers in which the involucre is absent and appear in great clusters or cymes.

Secondly, those whose flowers are surrounded by an involucre of usually four bracts, which in the bud guard the small flower clusters within. These white bracts are often mistaken for the petals of the flowers, of which there are none. The most beautiful and desirable for garden purposes belong to this group and include the smallest as well as the largest of the genus.

The first group includes such well-known shrubs as *C. alba*, *C. Amomum*, *C. sanguinea*, *C. stolonifera* and many more, some of which reach the proportions of small trees. In the dull gray days of winter, many of these shrubby dogwoods bring a pleasant splash of color into the landscape.

C. alba, a shrub up to ten feet, has bright red branches. The bark of *C. stolonifera* is a darker red, while that of *C. sanguinea* and *C. Amomum* is dark blood red or purple. Any one of these seen growing along the highway in company with the yellow-barked *C. stolonifera* var. *flaviramea* or with the yellow-barked willow makes a picture not soon to be forgotten. Many of these species are valued for their huge flower clusters in the spring and their fruit is beloved of the birds and small animals of the woods.

A common small tree of eastern North America is *C. alternifolia*, and as the name indicates it has leaves arranged alternately. It varies in form from a bush to a slender tree up to twenty-five feet in height. It has flat erect corymbs of cream-colored flowers followed by dark blue fruit on red peduncles. There are several varieties indicating slight

variations in form, leaf coloring, etc. Its oriental counterpart *C. controversa* is distributed throughout Asia from the Himalayas to Japan. Mr. E. H. Wilson in *More Aristocrats of the Garden* says, "*C. controversa* merits wide recognition. It is a fair-sized tree up to sixty feet, with a clean trunk, seven feet in girth . . . tiers of wide spreading branches, forming a flattened crown. The flowers are small, pure white, arranged in erect, flat corymbs each from four to five inches across, abundantly produced. These are followed by bloomy black fruit, round and about the size of a pea, with bright red stalks." These two are the only dogwoods with leaves arranged alternately and not in opposite pairs.

C. macrophylla is also widespread in the Orient and differs from *C. controversa* by following the custom of all dogwoods in producing its leaves in pairs. It is said to be one of the handsomest dogwoods because of its large leaves, and large panicles of white flowers. Mr. Wilson states that *C. controversa* sometimes grows to a height of sixty feet while *C. macrophylla* is a much larger tree, thus equaling or rivaling *C. Nuttallii* in height.

C. sanguinea is a shrub reaching a height of eight or nine feet and is common in hedges and thickets and shrubby plantings in Europe. Its branches are dark red, leaves oval and pointed, about two inches long by one and one-half wide, turning brilliant red in autumn, hence the name. The flowers are dull white in terminal clusters and the berries are small, dark purple in color, and bitter in taste. The wood is white and very hard and is used for skewers and other such purposes and is said to make the very best charcoal for gunpowder.

C. racemosa, also known as *C. candidissima* or *C. paniculata*, is a native of eastern U. S. from Maine to North Carolina, westward to Minnesota and Nebraska. It is one of the best for shrubberies, blooming profusely in June and later. It has a rather close bushy habit forming fine plants up to sixteen feet. At Arnold Arboretum there is a fine hybrid, *C. arnoldiana*, a cross between *C. racemosa*

and *C. obliqua*, the latter being closely allied to *C. Amomum*.

C. rugosa is also a native of eastern U. S. It is a stout shrub growing up to ten feet or more, with ivory white flowers in broad compact clusters, followed in early autumn by blue passing to white berries.

C. paucinervis is a native of central China and was one of Mr. Wilson's many introductions. It is four to six feet tall, relatively narrow dark green leaves and lustrous black fruit. It flowers late and holds its leaves far into the fall.

These are just a few of the many species having flowers in cymes without the involucre, which is so prominent in the following species.

C. canadensis, the little creeping dogwood, occurs in the leafy soils of the woods from Maine to Washington and south to Indiana, Colorado and California. Seen growing in dense mats or carpets in its native habitat among the ferns and mosses, under great evergreens, when in bloom it gives a thrill never to be forgotten and earns its right to be termed the most charming and beloved of all dogwoods. It has a creeping root stalk; the stems grow from four to six inches with a whorl of four to six leaves at the top and often a pair of typical dogwood leaves about midway up the stem. From May to early July, little flowers like great white strawberry blossoms appear, followed by bright red berries. If given proper conditions, leaf mold, moisture, shade and drainage it can be grown in gardens.

One of the earliest dogwoods to bloom is *C. mascula*, or *C. Mas*. It is often called the Cornelian cherry for its bright red cherry-like fruits. It is indigenous throughout Europe and Northern Asia. It is a handsome shrub or small tree up to twenty feet in height, of dense growth and glossy foliage. In early spring, tiny yellow flowers cover the leafless branches in great profusion. They are a soft pleasing shade of yellow and with a planting of blue *Chionodoxas* underneath make a beautiful picture. Like many of these early flowering shrubs, *C. Mas* should be planted where the sun strikes it against a dark background.

It was more popular formerly; the Forsythias, Corylopsis and Chinese witchhazel being much more showy have, to some extent, usurped its place. However, *C. Mas* has its bright red fruit which ripens in September or October. The cherry-like fruit is of a fine rich transparent scarlet, remaining on the shrub a long time after becoming ripe. On selected varieties the fruit varies in color from yellow to red and reddish purple. Parkinson, in his *Herbal*, says of the use of the fruit of *C. Mas*, "by reason of the pleasantness in them when ripe, they are much desired. They are also preserved and eaten both for rarity and delight and for the purpose aforesaid."

The fruit is said not to set until the shrub is some twelve or fifteen years old. There are several named varieties having ornamental foliage: *C. Mas aurea* has yellow leaves; var. *aurea elegantissima* has leaves variegated with pink or yellow; var. *argenteo-marginata* has leaves bordered with white. There are several other variations. In a garden where sentiment enters and plants of fine old tradition are cherished, *C. Mas* must surely find a place.

C. florida is the eastern dogwood that makes itself at home in the gardens of this locality much more readily than our own *C. Nuttallii*. It is undoubtedly one of the most beautiful of North American flowering trees. It is smaller and more graceful than *C. Nuttallii*, and is not so susceptible to fungus or crown canker that destroys so many of our native dogwoods in cultivation. In its own habitat *C. florida* is found growing as an undergrowth, among the tall hardwoods of the thin forests of Southeastern U. S. It grows into a small twiggy tree, fifteen to twenty feet high, rarely up to thirty or forty feet, with spreading branches. In its winter garb of reddish brown bark, the growing ends of twigs a silvery green, capped with little brown nubs of flower buds, it makes almost as beautiful a picture as when clad in its shimmering robes of spring. It was much admired by our early plant explorers and was first mentioned by Rev. John Bannister in *Ray's Historia Plantarum*, published in 1680, and later by
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Recent Developments and Improvements in Cultivated Plants

CLYDE CHANDLER*

THE practice of plant breeding goes back to the dawn of civilization. In due course of time man learned to save and use seeds and so he became a plant producer. Some of our producers today have hardly surpassed this early method of mass selection. Numerous plants are grown from seeds collected from an outstanding plant and further selections are made from the seedlings obtained. Natural "sports" or mutations, which are infrequent, are their only method of obtaining a new type of individual. The real progress in plant improvement awaited the recognition of sex in plants. The Babylonians realized there were two kinds of date palms, the female which bore fruit and the male which was sterile; and we know that artificial pollination was practiced before 700 B. C. Camerarius concluded as early as 1694 that plants follow the sexual method of reproduction. Kolreuter in the middle of the 18th century demonstrated that species could be crossed artificially and that both parents contributed to the offsprings' appearance. Gregor Mendel, about the middle of the 19th century, laid the foundation for most of the modern work on heredity and may well be said to have established genetics as a science, though its importance was not recognized until 1900 when de Vries in Holland, Correns in Germany and von Tschermak in Austria independently unearthed Mendel's paper and proclaimed its importance to the world.

The recognition of certain existing facts in plant behavior has greatly aided the plant breeder in solving his problems.

1. Most plants are monoecious, e.g., both male and female organs are in the same flower. Some plants may have the sexes born in different flowers but both types of flowers occur on the same plant, as in the begonias. These plants are also monoecious.

However, many species have the sexes on different plants as in *Bryonia*, *Melandrium*, *Ilex*, *Ginkgo* and *Salix*. These are dioecious.

2. Heterostyly has been reported in several groups of plants. For example two or three kinds of flowers occur on the same or different plants of the same species. One flower may have long stamens and a short style while another flower has short stamens and a long style. This is known as dimorphic heterostylism. Three variations in the length of the styles and the stamens, e.g., long styles with medium and short anthers, medium styles with long and short anthers, and short styles with its long and medium anthers, is known as a trimorphic type. The result of this condition is that self-pollinations fail to produce fruit and that cross pollinations which have been shown in numerous instances to produce more vigorous offspring are enforced.

3. The term "Dichogamie" was first used by Sprengel in 1793 to designate the condition of an hermaphrodite flower when its two kinds of sex organs mature in different intervals of time. This also prevent self-pollination.

4. Due to difference in time of flowering of plants of the same or of different species it is desirable to store pollen until it is needed for pollination. Pollen may be kept viable for a considerable period of time if stored under proper conditions.

5. Embryo culture has been of great value to the plant breeder, especially when it is desired to hybridize two particularly difficult forms or when the hastening of breeding cycles is desirable. For example, in Rose growing embryo culture is recommended to shorten the breeding cycle by three or four months. For many hybridization pollinations it is definitely known that fertilization occurs but that the embryo dies before maturity. These as well as mature embryos may be excised and grown in sterile agar.

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6. Acceleration of seed germination has been one of the greatest aids to the plant breeder in his work. Hard coated seeds germinate more readily if scarified or pretreated with hot water or sulfuric acid before planting. The dormancy of some seeds may be broken by alternating temperatures. Refrigeration and controlled moisture hasten chemical changes required for germination in such seeds as delphinium, roses, pansies, parsley, lettuce and carrots.

7. Hormones have helped the breeder root more quickly cuttings of individual plants from which he needs to make clonal propagations in order to run field tests of various hybrid stock.

8. The renewed interest in the study of cytology, the cell and its contents and behavior, has helped the geneticist to understand many of the results he obtains. More recently the taxonomist has turned to cytology for help in analyzing natural populations of plants which might in earlier time have been given species rank, but which are now known to be natural hybrids. In some cases new and more desirable forms of plants may result from increasing the number of chromosomes in the nuclei. Such plants are called polyploids. Darrow and others (1944) have made a study of blueberries which exhibit a natural polyploid series: diploids ($2n=24$), tetraploids ($2n=48$), hexaploids ($2n=72$), aneuploids [$2n=50$ ($4n+2$)], and pentaploids ($2n=60$). Darrow and Camp (1945) have shown how genetics may well serve the taxonomist in his evaluation of the species. This excellent paper discusses the breeding work on blueberries as carried on in the greenhouses and experimental plots at Beltsville, Maryland, where the parent material was assembled for genetical study. Cross combinations were made between diploids, tetraploids and hexaploids. Heteroploid combinations were also made. Approximately 18,000 plants from controlled hybridization pollinations were planted in trial plots in various places in New Jersey, Maryland, North Carolina, South Carolina, Georgia and Louisiana where climatic conditions were more favorable than at Beltsville. Many

natural populations have thus been duplicated experimentally. These hybrid seedlings are being evaluated on the basis of quality, color and size of fruit, length of the period of bud dormancy, date of ripening of fruit, plant habit, disease resistance and ornamental possibilities. Though an all-purpose blueberry may not be possible, many good plants will be selected which will meet all the requirements of the blueberry grower, no doubt with fruit measuring an inch in diameter on some of these hybrid seedlings.

9. Chemical induction of parthenocarpic fruits has been reported for tomatoes, peppers, strawberries, watermelons and cucumbers. Gardner and Marth (1937) sprayed holly flowers with 100 mg. of naphthalene acetic acid in 100 cc. H_2O and each produced a fruit without pollination.

10. During the past ten years the plant breeder has been inducing mutations by various methods as: chemical treatments, x-ray ultraviolet light, and low and high temperatures. Colchicine has perhaps been the most universally employed and more mutations have resulted from its use than from any other method. Colchicine works by delaying cell division while chromosomal divisions proceed normally, thus forming cells and from them plants with two or more times the original chromosome number. Seed soaking or immersion of young growing points of seedlings in aqueous solutions of colchicine, spraying of growing points and dropping of colchicine in an emulsified solution on growing points have been among the most successful methods of using this chemical to produce polyploids.

11. Recent reports on the effect of radioactive materials on plant growth have been very conflicting and inconclusive. Observations and experiments to date involve crop plants for the most part. However, the effect on woody plants should not be completely ignored. This phase of research has just begun and within the next ten years we may expect as extended a bibliography for "The effect of radioactive materials on plants" as we have accumulated for colchicine effects during the last decade.

12. Too much importance can not be given to the need of organized societies through which new hybrids may be introduced to the public. The American Rose Society has maintained an up-to-date record of the new rose varieties. A total of 152 varieties are described in the 1949 rose annual which brings the total up to 3103. Many other societies are performing the same service for other plant groups.

Some Examples of New Cultivated Plants

Perhaps the most highly advertised tetraploid flowering plant produced by the use of colchicine is the Tetra Red Phlox introduced by W. Atlee Burpee Seed Co. Induced tetraploids usually have larger flowers, deeper color, more vigorous habit, larger leaves, thicker stems, larger pollen grains, increased stomata size and altered fertility. The oil content or the alkaloids may be increased as have been reported by Ruttle (1939) for *Mentha* and *Digitalis* by Bonisteel (1942). Self-incompatibilities may be removed as has been noted in *Petunia* (Stout and Chandler 1941). Vitamin C content of the lower leaves of cabbage has been increased four times over that of the diploid progenitor (Newcomer 1943). Total polyploidy does not always follow colchicine treatment. Only parts of the tissue may be affected which results in sectoral or periclinal chimeras as observed in cranberries by Dermen and Bain (1941). Sax (1947) and his fellow workers at the Arnold Arboretum have produced a tetraploid *Forsythia* by treating a seedling of *F. intermedia* with colchicine. This plant has the characteristics of other induced polyploids. Stems are erect, leaves thicker, flowers larger, color darker, and it is hardier than most species of *Forsythia* although probably not as hardy as *F. ovata*. The results obtained by treating plants with colchicine are not always favorable and often the induced tetraploid may be inferior to the diploid. However, by obtaining such tetraploids, crosses between certain species of plants which have heretofore failed may be accomplished. By doubling the chromosome number in annual phlox it may be possible to hybridize them with the perennial forms.

Eigsti (1947) published a bibliography of over 1200 titles of papers dealing with colchicine. Little work has been done on trees and shrubs. Polyploids have been induced in a few of our fruit trees. Pine and larch seeds have been treated with colchicine, but no report has been made as to the results. Colchicine induced tetraploidy has been reported by Jansen and Levan (1941) for *Sequoia gigantea*.

New vegetable and grain crops have probably received more intensive attention and research work from the plant geneticist than any other types of plants. Hybrid corn is perhaps the best example of the influence of theoretical scientific research on revolutionizing the production of an agricultural crop. Iowa is reported growing 100 per cent hybrid corn, Illinois and Indiana 99 per cent, and most other corn belt states over 90 per cent. In 1932, corn harvested from 110,577 thousand acres yielded 2,930,352 thousand bushels. In 1946 corn harvested from 88,718 thousand acres yielded 3,287,927 thousand bushels; only 80 per cent of the land planted in corn in 1932 was planted in 1946 and this area gave an increase in production of 357,575 thousand bushels.

This paper does not permit the discussion of the work which has been done on cereals; however, it should be mentioned that higher yielding oat varieties resistant to injurious rusts and smuts have been produced through selective breeding. Today more oats are being raised than 30 years ago. About 40 per cent of our barley acreage is being planted to the improved barley with smooth, barbless awns which has been developed scientifically. These improved varieties also have greater resistance to drought, disease, insects and lodging. Disease-resistant wheat as well as early maturing varieties have been developed.

Powers (1939) working at the United States Department of Agriculture's Horticultural Field Station in Cheyenne, Wyoming, produced the Cheyenne Bush Pumpkin which matures early, requires only a small area, and produces an excellent pie fruit. Each year new varieties of tomatoes, squash, pepper, peas, beans and eggplant especially selected

for disease resistance, vigor and improved quality of fruit are introduced thorough various seed companies.

Among the ornamentals, the rose has probably received more attention from the plant breeder. Twenty new roses were patented in 1948 and 19 to date in 1949. "Peace" is one of the newer roses which has received outstanding praise.

Botanists recognize about 25 species of wild lilacs. Nurserymen and plant breeders have originated nearly 500 varieties. The Lemoines originated over 200 of these varieties, 79 of which are to be found in the Recommended list of 100 best varieties. Only 21 varieties of all other breeders of all countries are included in this list. At the present time hybrids produced by Havemeyer, Mrs. Klager, Miss Preston and Skinner are being grown and evaluated. As suggested by Skinner (1948) the work of raising a type of "American Lilac" has merely begun. Miss Preston's hybrid *Syringa prestoniae* obtained from *S. villosa* and *S. reflexa* is of special value because of its hardiness in areas where frost usually comes just before the regular blooming period.

Bischoff (1949) points out that much renewed interest has been shown in the Hibiscus during the past few years and that thousands of hybrid seedlings have been produced in Texas, Florida and California. Many of these hybrids have been named and, no doubt, are so much alike that the confusion which now exists can be straightened out only through organization and close cooperation of the hybridizers themselves. According to Bischoff, Edward M. Schattle of Miami has been breeding Hibiscus for three years and lists some 500 varieties. He has brought out five new Hibiscus which are the result of 5000 pollinations.

The tree peony has been in cultivation in this country for nearly a century and a half. Collections of 25 or more named varieties were exhibited at flower shows at both Boston and Philadelphia 120 years ago. John Dunbar brought named varieties from Japan in the early 90's and saved the seed. Some 5000

seedlings are to be seen in the Rochester parks today. The collection at Swarthmore College has over 200 of the finest varieties which are now 13-18 years old.

Standardized Plant Names (1942) lists 42 named varieties of *Philadelphus* credited to the French horticulturist Lemoine. Flowers are all white with one exception which is white with a purple spot. Flower form and size and vegetative habit of the plants vary with the different varieties. Sax (1947) described the "Arnold Dwarf" Forsythia which is a cross between *F. intermedia* and *F. japonica*. The drooping branches root readily to produce a mass of foliage which makes an excellent ground cover. Branches are very slender and leaves are only about an inch long.

Some of the more recently patented plants include:

1. Juniper tree which is silver gray in color, slow growing, pyramidal in shape, requiring no pruning, and resistant to disease and insects.

2. Flowering quince plant with prolific bloom. It has single flowers at the beginning of the season, but double later in season. Flowers are white upon opening, but change to rose pink with age.

3. Honey locust tree which is commercially important because of its quick growth and uniform symmetrical shape. The tree is male and therefore bears no fruit which is a decided advantage when used for ornamental plantings. It is hardy, thornless and is a good shade tree for park plantings.

4. A rich ox-blood red flowered Hibiscus plant with deeply cut dark green and shiny foliage which lacks the usual coarseness and hairiness of other varieties.

5. An upright *Cydonia japonica* plant which is desirable as a hedge plant because it needs very little pruning. Its flowers are very large and, due to few lateral branches, are well exposed to view.

6. A pecan tree of vigorous growth with no splitting or breaking of limbs, medium spreading upright form, and adapted to a wide climatic and soil range. Its early and

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Dr. Wyman's Visit

DR. Donald Wyman, chief horticulturist of the Arnold Arboretum honored us with a visit to the University of Washington Arboretum, in late July. He came to Seattle at the end of an extended tour through the country and along the Pacific Coast, which added weight to his enthusiasm for the Northwest and our Arboretum.

Dr. Wyman had been in Seattle previously when the Arboretum was in its earliest infancy, scarcely born, and struggling to survive on its first inadequate nourishment. He expressed delight and surprise at the extent to which its collections have grown, and pleasure in the excellence of its present administration and especially in the growth of community interest in it, which he considers of great importance to its success. He repeated often his envy of the opportunity our climatic condition offers, tempering somewhat our pride in our accomplishments, by comparing the wide variety it should allow us to grow with the handicaps met elsewhere. In showing his very beautiful slides of Arnold and other Arboreta, he continually stressed the difficulties encountered in their low temperatures, in spite of which many of them made us gasp at their breath-taking beauty.

Some very practical ideas emerged during Dr. Wyman's talk—the plan followed by Arnold Arboretum of having a large row planting of shrubs quite away from the regular Arboretum collections, to enable the learning amateur and the eager nurseryman to see which varieties are best and which most suited to different needs; a scheme pictured at Morton Arboretum, of growing a series of hedges in many materials to show how the types grow and the degree of hardiness to be expected. For every one variety in these pictured and enumerated by Dr. Wyman we can grow in this climate four or five. It is to be hoped that our staff, who were equally impressed with the laymen who heard this talk, will be able to find time, space, and funds to carry out some such projects.

Ideas and Development, Unlimited! Budget, Limited! But as the members of the Arboretum Foundation are successful in helping the people of the state to realize the value of the University of Washington Arboretum, we can, with patience and effort, bring to fruition Dr. Wyman's and our own vision of usefulness and beauty which it represents. We were indeed fortunate to have the stimulus of this outstanding horticulturist.



Autumn Color in Westonbirt Arboretum

W. J. MITCHELL*

THE late owner of the above Arboretum and his father before him were perhaps the largest planters in this country for autumn color effect, and how largely their efforts were successful can be seen in the considerable increase in this type of planting in late years, largely inspired by the display as seen here.

In the Cotswolds the soil conditions seem to be suitable for producing this wonderful color, more so than in many other parts of the country. The indigenous plants in hedge-row and covert color beautifully when we get a good season. This may have been an added reason why the owners planted so largely for color.

This color has to be seen to be believed, even by one with imagination. No one would realize what it is like unless they saw it.

Usually the first trees to color are the Sugar Maple (*Acer saccharum*), Red Maple (*Acer rubrum*) and the Yellow-wood (*Cladrastis lutea*) all from America; the Norway Maple (*Acer platanoides*) and its varieties; *Prunus Sargentii* from Japan, a dual purpose tree as it is lovely in flower in spring as well as beautiful in the autumn, and some members of the *Euonymus* family—*E. oxyphyllus*, *E. yedoensis* and *E. planipes*. *Acer saccharum* is very fine in color, flame predominating, but it is fleeting and does not retain its beauty long. *Acer rubrum* is not a fast grower; I think sometimes we do not get sun enough for it. The color is crimson, much darker than the sugar maple. The Norway maple grows much larger than the preceding, and not so reliable in its coloring. There are several large trees in the Silkwood part of the Arboretum which are very good in some seasons. Unfortunately

*Mr. W. J. Mitchell has been in charge of this large and notable English Arboretum, owned by Lord Morley, for many years. It is located in the western half of England and possesses at least a national reputation for autumn coloration.

one of them was blown down in a gale last year. *Cladrastis lutea* has not been largely planted; it colors early and is a beautiful yellow. Regrettably our largest tree fell in the summer of 1946. It was about 70 feet high. *Euonymus yedoensis* is one of the earliest things to start coloring and is usually over when other things are at their best. It is generally yellow with the veins of the leaf red. The fruit of this species is very beautiful and remains some time on the plant. *E. oxyphyllus* is another early coloring one, rather distinct in color, madder red. *E. planipes* is better known and has been more frequently planted than the preceding. It is somewhat like *E. latifolius* but not so good in coloring though the berries open and display the striking scarlet seeds.

Many of the North American *Crataegus* color well with us; the fruits too are beautiful, and earlier than many berrying plants.

The finest family for autumn color generally is the maples, and of these the Japanese *Acer palmatum* and its varieties have been planted in quantity. These do not mind the shade of other trees if not too dense, and color just as well in shade as they do in the open. *Acer japonicum* and its varieties, *vitifolium* and *laciniatum*, we find only turn yellow in shade but in the open this is perhaps the most gorgeous coloring maple in cultivation. In places it has reached a height of 25 to 30 feet. The large trees of the first introduction of *Acer griseum* are not so good in color as later introductions. Young trees are magnificent. Other fine coloring maples are *A. rufrinerve* and its var. *albo-limbatum*; *A. Maximowiczii*, usually a glorious tangerine color; *A. capillipes*; *A. Henryi*; *A. cappadocicum*, pure yellow; *A. carpinifolium*; *A. cissifolium*; *A. Davidii*; *A. diabolicum*; *A. ginnala*; *A. Miyabei*, fine yellow; *A. trifidum*; *A. nikoense*, salmon pink; the Moosewood, *A. pennsylvanicum*, yellow, and *A. triflorum*. This last is not so good as I have seen it else-



Dr. Donald Wyman (left) and Mr. B. O. Mulligan—Photo courtesy *The Seattle Times*.

where. Of these, a well-colored *A. nikoense* is hard to beat.

Sorbus is another family largely planted here and many of them are desirable for their autumn coloring and berries, especially those kinds from which the birds do not take the berries. The Himalayan *Sorbus vestita* is usually very late, golden yellow, and the fallen leaves are very beautiful on the ground. *S. Sargentiana*, *S. Esserteauiana*, *S. scalaris*, *S. Prattii*, *S. rufo-ferruginea*, *S. domestica*, *S. torminalis*, *S. hupehensis*; this last is perhaps the most beautiful of the family in the autumn, the color cerise pink and fruits white; *S. Prattii* is also white fruited. *S. Sargentiana*, a pinnate-leaved species with broad individual leaflets, is magnificent in some seasons. *S. Esserteauiana* and *S. scalaris* are both good fruiting species; the foliage turns yellow and birds do not touch the fruit.

Rhus Potaninii here is attaining tree-like proportions and is exceedingly beautiful when it turns to a soft shade of red. *Cotinus Americanus* (*Rhus cotinoides*) is magnificent especially in some autumns. The purple form of *C. Coggygria* (*Rhus Cotinus*) colors much better than the ordinary one. *R. copallina*, the shining Sumac, is very fine in color but we are not very successful with it. The cut-leaved form of *R. typhina*, var. *laciniata*, is another very beautiful Sumac.

The North American hickories are growing very satisfactorily; unfortunately they are attacked by grey squirrels which entirely defoliate them in June. Their usual color is a fine golden yellow.

The Tupelo, *Nyssa sylvatica*, and the Sweet Gum, *Liquidambar styraciflua*, both from America, are outstanding reds. The latter retains its leaves in condition longer than anything else. The *Nyssa* is very slow-growing and takes a number of years to get any size.

The American oaks, with the exception of *Quercus rubra* and *Q. coccinea*, the Scarlet oak, are not easy in this country, and there are very few trees of *Quercus alba* which are outstanding. *Q. rubra* is the best grower, and a well-grown tree of it is very beautiful. It is

not so good in color as the Scarlet oak, which is magnificent, and thrives very well. Waterer's variety is perhaps the best, although we have some fine seedling forms. It is interesting in that the fiery red foliage eventually becomes a rich brown and remains on the trees in this state for a considerable time.

Perhaps there is nothing more beautiful than *Cercidiphyllum japonicum*, the Katsura tree from Japan, especially if we get a damp summer; it dislikes drought and always colors better if it has a fair amount of moisture at the root. The hue is impossible to describe as there seems to be every shade from pale green to crimson. The same may be said of the vigorous growing *Parrotia persica*; some autumns it can be seen from afar, its coloring is so wonderful.

Certain plants of *Euonymus alatus* color a rich shade of ruby red, others pink, and still others red. They are all very beautiful but I think the ruby red and the pink are the best. *E. verrucosus* is another beautiful species, becoming madder pink.

Liriodendron Tulipifera, the Tulip tree, is another favorite tree, the leaves turning clear yellow, and *Nothofagus procera*, one of the Southern beeches, turns rich tangerine before falling and is one of the latest things to retain its leaves.

For a position in the front of the shrub border nothing can be better than *Fothergilla monticola*, turning one of the finest reds. *Amelanchiers*, too, are very fine; also *Aronia arbutifolia*, another wonderful red.

Cotoneasters are usually associated with berries, but there are a few whose leaves turn a lovely red before falling; both *C. moupinensis* and *C. foveolata* are good in this respect and curiously both are black fruiting.

Of the *Viburnums* the finest is the American *V. alnifolium*, the Hobble-bush. The color is reddish bronze, the very large leaves of this species making it more effective. The Sheep-berry, *V. Lentago*, in full sun, too, can be very good, a fine red; *V. prunifolium* is usually more pink than red.

A small tree which is often very beautiful is *Zelkova crenata*; it is related to the elms

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Autumn Color—How It Comes About

Meritorious Plants Displaying It in New England

DONALD WYMAN*

AT THIS time of year everyone begins to notice trees and shrubs that are starting to change colors and replace the normal green color with brilliant reds and yellows. New England is very fortunate in being located in one of the few regions of the world where climatic conditions are just right to form these brilliant fall colors. Other areas of the world may be fortunate in having large areas covered with evergreen forests, but New England is fortunate to possess many hardwood forests made up of oaks and maples which color beautifully in the fall.

There is only one small region in the southern hemisphere where autumn coloration of foliage prevails and that is in South America. In the northern hemisphere there is a large region in eastern Asia, including central and northern Japan, and a small region in the southwestern part of Europe. In North America, the region characterized by brilliant autumn foliage extends from the Gulf of St. Lawrence to the southern United States and westward to the Great Plains, areas of extensive deciduous forests. Also there are certain areas on the Pacific Coast, especially in the higher elevations.

In North America the most brilliant displays of autumn color are of course in southeastern Canada, northeastern United States and in certain areas of high altitude, in the Rocky Mountain area and on the Pacific Coast. The further south one goes the less brilliant is the display of autumn color, particularly in areas along the seacoast. In the higher altitudes of the South such as the Blue Ridge Mountains, the color is usually just as brilliant as in the northeastern United States.

*Dr. Donald Wyman, who so recently honored Seattle with a visit (Page 14), certainly needs no introduction to those who attended his lecture and showing of slides. Nor, indeed, to countless others who have read his books and articles on a wide range of horticultural subjects—all from the pen of one who leads a most busy life at his post as Horticulturist of Arnold Arboretum, Harvard University.

Autumn color varies considerably from year to year and many people who have observed this phenomenon closely have noted that some years it is much more pronounced than others.

There are plants the foliage of which always turns yellow in the fall, but it is the brilliant reds and gorgeous scarlets which in combination with the yellows make autumn color of outstanding beauty. Also it is largely the reds and the scarlets which are intensified by the right climatic conditions.

Why Plants Are Green

All leaves are green because they contain a highly complex material called chlorophyll which is essential to the growth of most plants. When this is provided with certain materials and conditions of light, warmth and water, it is able to manufacture food or sugars upon which the plants live. It is interesting to note that this green coloring matter is being continually made in the leaf while at the same time it is continually being broken down. Ordinarily the rate of its breakdown about equals the rate of its manufacture but in the fall there comes a time when there is little if any new green color material made, although it is still being broken down at this time.

Why Leaves Are Yellow

Eventually in the fall a stage is reached where there is little if any chlorophyll manufactured and most of it already made has been completely destroyed. This is the reason why leaves are yellow for there are always present two yellow coloring pigments which are continually masked by the green chlorophyll, but when this chlorophyll is destroyed these pigments become apparent. It is the same material which gives the yellow of egg yolks and carrots and it is in many flowers.

When green plants are taken into dark places the leaves always turn yellow, but when they are exposed to bright sunlight they rap-

idly turn green. This is simply because chlorophyll is manufactured only in sunlight.

The gradual stopping of the chlorophyll manufacture and the complete breakdown of all previously made, completes the first step in autumn coloration. There are some plants, like most of the Magnolias for instance, the Tree of Heaven and most of the lilacs, the leaves of which do not turn yellow in the fall but change directly from green to brown. For some reason the breakdown of the chlorophyll does not start soon enough or is not complete enough to result in the appearance of the yellow pigments but there are many plants which can always be depended upon year after year to color a brilliant yellow regardless of weather conditions.

Why Leaves Are Red

The gorgeous beauty of most autumn color combinations results from the brilliant reds and scarlets, together with the yellows. The sassafras, some of the maples, oaks, sumacs, sourwood, tupelo and other plants are particularly outstanding for their brilliant red autumn color. These plants are most interesting in that the brilliance of their color apparently varies from year to year. The red in their leaves is caused by a third pigment called anthocyanin, which results in some way from the accumulation of sugars and tannins in the leaf. In some of the maples valued for their sugar production, it is probably the sugars which cause this red color. The oaks, however, being rich in tannins, probably owe their high autumn coloration to the presence of these.

There are two factors necessary in the production of red autumn color. The first is light. There must be warm, bright, sunny days in the fall during which time the leaves naturally manufacture a great deal of sugar. Secondly, such days must be followed by cool nights, during which the temperature is below 45 degrees F. Plant physiologists have shown definitely that, under such conditions, there is little or no translocation of sugars and other materials from the leaf to other parts of the plant. In other words, when cool nights occur following warm, bright, sunny days, sugars and other materials are "trapped" in the

leaves. The accumulation of these products results in the manufacture of this red coloring material.

When one observes a certain tree that may be red only on that side exposed to the sun the combination of these factors is well understood. Other leaves not directly in the sun's rays may be green or yellow. Leaves exposed to the sun have been able to manufacture more sugars, which, when accumulated and "trapped" in the leaves by cold night temperatures may result in red color. It is interesting to note that trees and shrubs growing in swamps and other low places are often among the first to color in the fall because it is in such places that the cold air first settles on still nights.

A warm, cloudy fall, sometimes with much rain, will restrict the formation of bright colored foliage. With insufficient sunlight, the sugar production is greatly reduced, and with warm nights, what little sugar has been manufactured in the leaves can be readily transported to the trunk and roots where it has no effect on the color of the foliage.

Many Evergreens Change Color in the Fall

The leaves of many evergreens change color in the autumn. Some of the junipers and arborvitae are listed in the following groups. Some of the older needles on pines may turn yellow but usually such color lasts only for a short time, the leaves quickly turning brown. This is particularly true of those evergreen leaves which are normally shed each year, and although the autumn color may not be conspicuous in many evergreen plants, nevertheless it is evident on close examination.

All leaves eventually turn brown. This is not an autumn color but is merely the result of the death, and in some cases of the decay of the plant tissue. Sometimes, the leaves turn brown while they still remain on the tree, as in the American beech and in some of the oaks. In other cases, like the sugar maple and the spicebush, the leaves drop from the plants while they are still brightly colored and turn brown afterwards.

There are plants the leaves of which will always turn yellow regardless of current cli-

(Continued on Page 41)

The Fall Coloration of Nikko National Park, Japan

YOSHIHARU MATSUMURU*

THERE are many famous places of fall coloration in Japan: for example, Shiobara, Mt. Myogi, Takao, Figenji, Kankakei and Yabakei, etc. Among them, the scenery of Nikko excels, not only in diversity of color and grand prospects, but also in the seasonal differences according to different altitudes. So many people, therefore, come sight-seeing in fall that the special train and car decorated with maples is put on.

The nature of the soil at the north side of Daiya Valley and Lake Chuzenji is different from the south. The north is volcanic blocks whereas the south is abyssal. The former includes some kinds of andesites, and the latter a set of biotite granite quartz and granite porphyries. The acidity pH 5.6 to 6.2 of soil and pH 6.4 to 6.7 of water in our Botanical Garden must be evidence of the acidity of these rocks.

In the tertiary period, the volcanic lava ran over three points of Nikko Valley and divided it into four parts. First, the lava from Mt. Maeshirane dammed the stream at Yutaki waterfall and formed Lake Yunoko. Second, the lava from Mt. Nantai made Ryuzu waterfall and Senjo lake. Third, the same lava covered another place down the valley and made the very famous Kegon waterfall and Chuzenji lake.

To understand this subject it is convenient to divide the whole area of Nikko into four parts.

A. Daiya Valley Region—Lower deciduous forest (*Castanea*) belt.

B. Chuzenji Lakeside Region—Upper deciduous forest (*Fagus*) belt.

C. Senjogahara Upland Moor Region—Coniferous and deciduous mixed forest.

D. Yunoko Lakeside Region—the Sub-alpine belt.

There is much more precipitation in summer than in winter in the Nikko District. So

it is drier from autumn to winter than in summer. Tab. 1).

TABLE 1 (10 years average)

Regions	Summer	Winter	Total
	half (4-9) mm.	half (10-3) mm.	
(A) Bot. Garden	1463	542	2005 (78.94")
(B) Chuzenji	1579	612	2191 (86.26")
(C) Senjogahara	1262 (5-9)	226 (10-11)	1488 (58.58")
(D) Yumoto	1148	651	1799 (70.83")

As the granite rocks are not suitable for afforestation, the natural forests remain on those rocks. Such a forest usually contains many coloring trees and shrubs. Therefore the fall coloration is more remarkable on the south of the valley but less on the north. The same can be seen around Lake Chuzenji and in the valley where it is clearly visible.

A.—Daiya Valley Region

This region is from 600 to 1000 meters altitude and in it stands our Botanical Garden. It is the only conspicuous spot of color on the north side of Daiya valley because of the richness of deciduous species. Mt. Nakimushi is the best place to see fall tints at the Garden. It starts to color usually in the middle of September every year and at the end of October is most attractive. The typical coloring plants are as follows:

Viburnum phlebotrichum, *Fraxinus Sieboldiana* var. *serrata*, *Rhododendron Wadatum*, *Vaccinium Smallii* and var. *minus*, *V. Oldhami*, *Tritomodon campanulatum*, *Clethra barbinervis*, *Cynoxylon japonicum* (*Cornus Kousa*), *Vitis Thunbergii*, *V. flexuosa*, *Parthenocissus Thunbergii*, *Acer Sieboldianum*, *A. cissifolium*, *A. nikoense* (most clear red), *Rhus trichocarpa*, *R. javanica*, *Sorbus commixta* and *Carpinus laxiflora*. These are all reddish.

Viburnum furcatum, *Styrax Shiraiana*, *Acanthopanax sciadophylloides*, *Evodiopanax innovans*, *Kalopanax pictus*, *Marlea macrophylla* var. *trilobata*, *Stewartia pseudocamelia*, *Sorbus japonica*, *Hydrangea hirta*, *Magnolia obovata*, *Hamamelis japonica*, *Castanea crenata*, *F. japonica*, *Quercus crispula* and *Populus Sieboldii*. These are yellow.

*Mr. Yoshiharu Matsumura is director of the garden of which he writes, Nikko Botanical Garden, Nippon, Tochigi-Ken, Japan.



There are twelve species and five varieties of cherries in our garden, and almost all of them turn to red in the fall. Last year we discovered the interesting fact that the leaves of *Prunus Sargentii* change their color within a day after only one cool night; i.e., the night of September 19 showed a minimum temperature of 5° C. (41° F.); on the 20th we found almost all of the leaves turned to red, and then we concluded that for coloration a long continued cool period is not necessary but only a low temperature on one occasion.

The top of this region is famous Akechidaira which maintains the highest honor for the greatest bird's-eye view.

B.—Chuzenji Lakeside Region

The most beautiful season of this region is from early to mid-October, and here many kinds of maple trees grow, throwing their brilliant print upon the lake. The chief of them are as follows:

Acer amoenum, *A. japonicum* and var. *macrophyllum*, *A. micranthum*, *A. ornatum* var. *Matsumurae*, *A. Shirasawanum*, *A. Sieboldianum* and *A. Tschonoskii*. As the moisture gives good conditions for growing trees, there is a fine thick forest at the lake-side. And we can see the vines, *Vitis Kaempferi*, *V. flexuosa* and *Rhus ambigua*. Moreover, *Rhododendron pentaphyllum* (*nikoense*), *R. quinquefolium*, *R. japonicum*, *Tritomodon campanulatum*, *Tripetaleia paniculata*, *Vaccinium Oldhamii*, *V. Usunoki*, *Euonymus alatus*, *Prunus Sargentii* and *P. verecunda* are very conspicuous. But among all these we do not hesitate to recommend as most brilliant *Sorbus nikkoensis*.

Besides those sorts turning red there are many yellow ones in this section; for example, *Cornus controversa*, *Evodiopanax innovans*, *Kalopanax pictus* var. *magnificus*, *Stewartia pseudocamellia*, *Acer carpinifolium*, *A. mono*, *A. rufinerve*, *Euonymus sachalinensis*, *E. Vi-*

dalii, *Phellodendron japonicum*, *P. Lavalleyi*, *Hamamelis japonica*, *Cercidiphyllum japonicum*, *Fagus crenata*, *Betula platyphylla* var. *japonica*, *Carpinus japonica* (*carpinoides*), and *Populus suaveolens*, etc. We are very sorry to say that the coloration beyond Chuzenji is decreasing in beauty because of gases from a copper refinery.

C.—Senjogahara Upland Moor Region

This is the flat land about 1100 meters altitude. It was formerly a lake and is now becoming grass land. It shows very high hydrogen-ion concentration in swamps, as pH=5.7 to 6.5.

There are three remarkable species, *Rhododendron japonicum*, *Malus Toringo* var. *korringo* subvar. *vulgaris*, turning to red, and *Larix leptolepis* (*Kaempferi*) which turns yellow. The latter forms a noble design on the skirts of the surrounding mountains at the end of September. But the *Malus* forms high relief work in sandy, alluvial soil, except the swamps, and cuts brilliant figures not only of the leaves but also of the rich fruits, bearing just as in an apple orchard. And these call us until early in November. Moreover, around this region *Betula platyphylla* var. *japonica* and *Quercus crispula* are associated with the *Larix* and also turn yellow.

D.—Yunoko Lakeside Region

This is the area from about 1500 to 2000 meters altitude. Here the coloration starts early in August gradually from the upper regions. It is rather inconspicuous in the sub-alpine area because there are very few deciduous kinds, although rich in coniferous trees. The autumnal tints of this part are in all their glory from the 20th to the end of September. It is reasonable to believe that this is much cooler than the other areas.

At first, *Betula Ermani* var. *communis*, *Tripterygium Regelii*, *Prunus nipponica*, and *Cercidiphyllum magnificum*, etc., show their colors near the skyline. And then *Tritomodon campanulatum*, *T. Tschonoskii*, *Euonymus nikkoensis*, *Rhus ambigua* and *Sorbus rufoferruginea* turn red at the lakeside. The yellows, yellowish browns and reddish yellows

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Map of area around Nikko, Japan.—Photo by E. F. Marten. (NOTE: Nikko is situated in central Japan on the island of Honshu, approximately 70 miles north of Tokyo and 60 miles from the east coast. In latitude it corresponds with Fresno in California, or southern Spain or Sicily in Europe, but differs considerably in climate.)

Fall Coloring—Seattle

MARGUERITE WHITE FIELD*

ACCORDING to Webster a gardener is one who tills the soil, but many who never even pull a weed consider themselves gardeners by virtue of supervision. At any rate it is a curious fact that every garden, in time, assumes the characteristics and life of its owner irrespective of who planted it. There is the scrupulously neat, tidy garden of the perfectionist as he or she specializes in one or two varieties of plants—there is the busy garden cluttered with innumerable tiny shoots of propagation of the true horticulturist—there is the restful garden of the thinker or dreamer with various greens and stretches of lawn with fascinating shadows, carefully planned and cherished—there is the exuberance of a spring garden—the gaiety of a summer garden, and the challenge and joy of the all year round garden with something of interest and beauty at all times, like a well-rounded full life. To be successful, a plan is just as necessary as composition in a picture and we may develop various pictures within one's garden. Color is next in importance, so please think especially of Fall Coloring to counterbalance the unmistakable note of sadness that steals into the atmosphere. The cheery hues warm our hearts as our hearth fires warm our chilled bodies, but in spite of the usual glowing sunshine it is tempered by a slight chill and occasionally the sky weeps. It was F. F. Rousseau who said, "Men do nothing excellent but by imitation of nature," so let us in our gardens try to imitate nature as best we can.

Whether one's taste chooses formal or informal, a background of green is necessary either in city or country, and privacy is achieved with walls, hedges, or possibly only with judicious planting of evergreen trees and shrubs. Companionable size and texture of foliage is desirable, but think of the lovely bronze birches and spring flowering *Prunus* such as *Pissartii* (more commonly though incorrectly spelled *Pissardii*) with lower grow-

ing and later flowering *P. Blireiana* as a protecting background for azaleas such as the common bright yellow *Azalea pontica*, particularly valuable for beautifully colored autumn foliage. But for delicate beauty in spring as well as fall foliage, do treat yourself to *Azalea Schlippenbachii*. If space permits, nothing could be more enchanting in either spring or autumn than our native dogwood with azaleas at their feet, turning to rosy shades later on with a second crop of dogwood flowers at intervals. In a limited city garden, the pink or white blossoming eastern dogwood with beautiful autumn coloring may be used. *Cornus Kousa*, which grows to 20 feet and comes from China, Japan, and Korea, is a striking and beautiful species with fine coloring in fall. Variety *chinensis* is a very fine Chinese tree, with exceptionally large bracts and later scarlet foliage.

Our native vine maple *Acer circinatum* may grow up to 30 feet if allowed to form a trunk, but if grown the natural way makes a low spreading bush, the foliage assuming gorgeous tints of yellow, orange and crimson throughout summer and autumn. There is the silver maple, *Acer dasycarpum*, which the slightest breeze sets the graceful branches swaying, revealing the silvery leaf undersides. It is fast-growing, reaching about 60 feet. There are numerous Japanese maples to be chosen, largely as to size and shape to suit the location. *A. Henryi* (China) is a choice ornamental slow-growing species with foliage dull purple changing to vivid red in fall. Some become yellow while others have bright green leaves fading to bronzy purple. There is the deciduous Tulip Tree (*Liriodendron*) with large, tulip-shaped greenish-white flowers followed by yellow-tinged foliage.

Sumac (Stag's Horn), *Rhus*, has the advantage of needing little care; in fact the poorer the soil the more superb is the coloring. There is a dwarf species whose greenish-yellow flowers are succeeded by hairy, red fruits which together with the foliage changing to rich

*Mrs. Henry C. Field, long an active, enthusiastic Arboretum Foundation member, has been a member of its Board of Directors since 1942.

reddish-purple make an arresting picture. *Cotinus americanus*—the “Chittam Wood”—grows to 30 feet; it is rare but has the most gorgeous coloring; *Cotinus coggygia*, the Venetian Sumac, 12 feet. During July the very characteristic inflorescence turns to a pale flesh color, later becoming a smoke-gray, thus commonly referred to as “Smoke Tree.” The foliage turns a soft rosy-yellow. It shows up best with a background of dark green such as pines.

The numerous Japanese and Chinese Crabapples, for example *Malus Sieboldii*, develop fruit like glistening red cherries which last even to decorate Christmas wreaths, or, spiced, to grace one’s dinner table. The Siberian crabapple (*M. baccata*) grows to a great height, with white flowers followed by red fruit persisting after the fall of leaves. *Sorbus americana*, the Mountain Ash, is a near relative of the English “Rowan Tree” and bears clusters of bright red fruit.

Arbutus Unedo—strawberry tree—is attractive in autumn and winter with pinkish-white flowers and the previous year’s edible scarlet fruit, resembling strawberries, at the same time. *Liquidambar styraciflua*, the Sweet Gum—a beautiful tree with corky bark whose maple-like foliage turns to gorgeous shades of crimson and orange.

There are many shrubs as well whose berries are their great charm. *Berberis* (Barberry) of which there are a great number of species; *concinna*, deciduous with beautiful leaves, a silvery-white reverse, gorgeous autumn color, with unusual carmine-red fruits nearly as large as cherries; *Sargentiana*, whose evergreen foliage changes to vivid bronze and scarlet, with black berries; *Thunbergii*, compact deciduous Japanese and Chinese species, lovely in spring with hanging yellow blossoms followed by red berries and magnificent brilliant scarlet foliage in autumn; *Wilsonae*, discovered in China in 1903 by E. H. Wilson and named for his wife, the most charming of dwarf *Berberis*—2 to 4 feet—with golden-yellow blossoms followed by coral berries.

Mahonia Aquifolium, a native of Western North America, whose well-known, dark glossy-green leaves turn to purple and bronze in late fall, the yellow flowers developing into violet-black berries.

Cotoneaster, deciduous and evergreen, exceeds even the mountain ash in brilliance of its fruits, most red, some black, and in some brightly colored foliage in autumn; *horizontalis*, useful for covering poor ground, banks, etc.; *Simonsii*, an old favorite and excellent hedge plant, with bright red berries and dark green, scarlet-tinted leaves; *tomentosa*, flowers pinkish, berries red; *divaricata*, berries scarlet with rich autumn foliage; *glabrata*, berries orange and brilliantly colored foliage.

The purple berries of *Pernettya* are beautiful and valuable for indoor decorations even until Christmas season. It is a shade-loving shrub as is the Snowberry (*Symphoricarpos*), which when cultivated in enriched soil bears little resemblance to its poor relatives along the roadside.

Abelia grandiflora is fragrant with white flowers tinged pink from July to October, as well as *Clethra* (Sweet Pepper Bush) which blossoms in late summer and autumn.

Not to be forgotten is the *Hamamelis* family of Witch-Hazel; *japonica rubra*, with reddish-gold flowers and attractive autumn foliage; *virginiana*, golden yellow scented flowers begin in September, until November.

There are numerous species of *Viburnum* whose foliage turns to brilliant hues with either red, blue or black berries; *Lentago*, Sheepberry; *Sargentii*, deciduous, Chinese, with corky bark, yellow and crimson foliage and crimson berries; *Sieboldii*, Japanese, with pink berries aging to blue-black with bronze red foliage; *tomentosum* is another favorite, and *Davidii*, low-growing evergreen, with turquoise berries in the fall.

Holly, *Ilex Aquifolium* (Common Holly), is so well known and admired that little need be said. There are many varieties and many uses for its bark and juice of its leaves as well as many traditions and tales, such as in olden times it was hated by the witches but

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Fragrance in the Evening of the Year

BRYAN TAYLOR*

ONE of the greatest delights, and one of the most stringent tests, of a landscaped garden, however small, is its beauty in Winter.

It is both easy and interesting to compile a list of flowers in bloom at Christmas time but, all too often, the names are just the poor ghosts of Summer and Autumn or else the tentative advances of Spring maidens, tempted by a mild spell of weather.

The honest fragrant flowers of Winter are headed by the exquisitely honey scented *Chimonanthus fragrans*, with its waxy yellow, chocolate centered bells carried on leafless pale green branches during January and February. It blooms poorly unless sheltered from cutting winds and planted in light and well-drained soil in a place where it will be well baked by the summer sun.

Among the *Viburnums* may be numbered some of the most beautiful, hardy ornamental shrubs and one of the indispensables is *V. fragrans*. Its richly scented pink buds, opening to white flowers, start in November and continue until early spring. A sheltered place in the sun is all it needs to do well.

It seems absurd to associate honeysuckles with December, but *Lonicera fragrantissima*, a neat little shrub with extremely fragrant creamy white bell-like flowers, blossoms from December to March. *L. Standishii*, very similar in all ways including fragrance, but growing 6-7 feet, is a close second. Both prefer a south wall. Prune after flowering. During the same months *Azara microphylla*, a graceful evergreen with glossy box-like foliage, will scent the garden with its fragrance. The tiny inconspicuous flowers will spread their perfume 15-20 yards on a mild day. In the autumn it may bear attractive orange red berries. It also benefits from a warm sheltered position.

In a mild January several of the *Daphnes* are in bloom. The old timer, *Daphne Mezereum*,

produces its delightfully fragrant blossoms, in colors ranging from rosy purple to white (*D. M. var. alba*) from December to March. The variety *alba* has another distinction in that the flowers are succeeded by clear yellow berries. *Daphne Blagayana*, a dwarf spreading evergreen shrub, whose clusters of white flowers in February and March are so fragrant that most of us will put up with its sulky habits and give it an extended trial.

The Witch-Hazels provide a Winter fragrance and display from November to February. *Hamamelis virginiana* commences almost as soon as its attractive, richly tinted yellow foliage drops in November. *H. mollis*, a perfect foil for *Rhododendron mucronulatum*, follows in late December and lasts till February. Then *H. japonica Zuccariniana*, less robust in growth, carries on the happy tale through March. The flowers of all have long narrow twisted petals of pure gold, except *H. j. Zuccariniana*, which possesses pale lemon yellow petals with a green calyx.

Fragrance is a question of noses—one nose says that the Witch-Hazels have a rich and spicy odor—the next states definitely that they have a dusty Eastern smell. So, having made an excuse to mention plants which to me have no smell but are otherwise delightful, I will introduce here the two Winter flowering Clematis. *Clematis cirrhosa* is a strong-growing evergreen vine which will reach a height of 20-25 feet, and bears delightful greenish-white bell-shaped flowers in December and January and is ideal on a west wall (and likes lime). *C. balearica*, also evergreen, will please with its white flowers in late winter. Both will stand cold but hate biting winds.

A native of California, *Osmaronia (Nuttallia) cerasiformis*, a hardy deciduous shrub, is worthy of a place in the background of the garden. Its short drooping sprays of almond-scented, greenish-white flowers appear from January to March and are followed by purple fruits with a plum-like bloom, hence the common western name, Indian Plum.

*A "first" article from Mr. Bryan Taylor, a member of The Bulletin editorial board, is most welcome.

Indispensable for the small garden is *Corylopsis pauciflora*, a delightfully graceful little shrub of 3-4 feet in height and spread. It bears, in February and March, clusters of very fragrant primrose yellow flowers on arching, light brown, leafless stems. This is undoubtedly the best of the species and a very definite rival to the Forsythias.

The well-known *Mahonia* (*Berberis*) *japonica* with its sprays of sweetly scented lemon yellow flowers above the magnificent bronzy green foliage, blooming in late February and March, is not to be overlooked. The large purple black berries in the fall provide another reason for including it. *M. Bealei* is an even more aristocratic relation, with larger leaves and shorter stalked flowers in greater profusion; it is a little hardier, resents transplanting and therefore should be moved while young.

With a little luck and good management *Rhododendron dauricum* will flower as early as January. A native of southeastern Siberia it rarely grows over 3 feet high, is deciduous, and bears fragrant pink blossoms in January and February. The early flowers may be damaged by hard frosts but more will open in the next mild spell. Plant small evergreens around them to protect against cold winds, the mid-day sun, and to set off the flowers.

Even after last winter's cold spell there is at least one *Mimosa* (*Acacia dealbata*) flourishing in Seattle on a sheltered south wall, so there is hope for all of us. The feathery, fern-like leaved tree will grow from 20-25 feet high and bears numerous spikes of small, delightfully scented, globular flowers from January to March. Remember that it *must* have a warm, sheltered position.

One of the most rewarding of the flowering Cherries is *Prunus subhirtella autumnalis*, delighting us as it does throughout the winter months from December to March, with its pale pink fragrant blossoms. The flowers if cut in the bud stage will last two or three weeks in the house.

The slow-growing *Magnolia stellata* just comes within the bounds of our calendar. The semi-double scented white flowers appear in

early March. It is one of the outstanding varieties, seldom exceeding 10 feet in height, and taking 15 to 20 years to reach this. Luckily it flowers while still very young!

The lovely lavender blue flowers of *Iris unguicularis* (*stylosa*) are designed for even the smallest garden. It is incredible how many flowers can be picked between November and March, from a clump only a foot square; incidentally, pick them in the bud stage as they will be spoiled by heavy rain. They enjoy being starved in a sunny spot by a wall, in light soil with plenty of lime rubble. Don't despair if they fail to flower the first year; they like time to settle down. The violet scented *Iris reticulata* must have room made for it in the garden—it is one of the easiest to grow and is perfect for small groupings in the rock garden. The flowers open in February and are pleasant in arrangements with light-colored foliage, such as variegated holly.

For the wild garden a humble old timer is the Winter Heliotrope, *Petasites fragrans*; the lilac colored daisy-like flowers appear in January and February and the perfume is indistinguishable from Heliotrope. Hardy and well able to take care of itself, it is best grown in a pot because every piece of root will grow and spread and then neither weeding nor praying will get rid of it!

Two treasures, which demand all that is left of our warm and sheltered wall space, both flowering in January and February, are *Edgeworthia chrysantha*, with round heads of gold, fading to cream, fragrant flowers, and *Freylinia cestroides* with buff colored flowers.

It is suggested that, if any of our readers have stocks of these plants, they should be donated to the Arboretum's new Winter Garden. Grave exception will be taken to any persons suggesting that they have *for sale* *Petasites fragrans*!

1 1 1

A book especially desired in the Arboretum library is: *Gardens of China*, published by The Ronald Press Company, New York. This would be a valuable addition to the library and greatly appreciated as a gift from interested Garden Club or individual. Price \$30.00.

Behavior of Plants from Foreign Countries in the Medicinal Gardens, U. of W.

LUDWIG METZGER*

IN THE Fall issue of the ARBORETUM BULLETIN, 1946, appeared a list of unusual trees and shrubs in the Garden of Medicinal Plants, mentioning also the type of soil in which they will grow and do their best. During the elapsed time between the Fall of 1946 and the Spring of 1949, the weather has sometimes been very severe for those plants and we could count on a loss of some of the more tender types, especially the ones from the southern hemisphere. To my surprise the majority of the plants came through last winter in better shape than was expected. Less than one per cent of the plants listed in 1946 are lost entirely, while two per cent of the deciduous plants lost their tender shoots and need pruning back. A few plants will have to be cut to the ground—the root system withstood the cold spell and they begin to sprout again.

A number of people are under the impression that trees and shrubs from Southern California cannot be grown here and for this reason I included some important plants. I always maintained that we could grow a greater variety of shrubs and trees in the Puget Sound country than can be grown in any other section and am sure there are other growers of foreign plants in this area, who have the same experience and will testify to that fact.

True, it takes some knowledge, patience, and in some cases quite a few years to get results and satisfaction, and only people with love for nature and beauty will take time and have patience to care for the plant until it is large enough to plant it where we wish to see it grow. If soil and location is not suitable to the plant, our love and time sacrificed in caring for it may be a total loss.

Location and soil condition are prime factors in solving that problem. After two to five years of tender care and moving it from warm

house to cold frame, the plant should be sufficiently large and hardened enough to be set out in its permanent location. By keeping in mind the size of the plant when fully grown and its requirement for a shady side or need of full exposure to the sun, the selection for its location should be easy.

The majority of trees and shrubs will do well in heavy loam, well drained. Use compost earth if you have to enrich your soil, otherwise a handful of 5-10-10 Mineral mixture will do the work. Add a tablespoonful of aluminum sulphate to acid loving plants. There is nothing better than 4 to 6 inches of leaves to protect the root system from freezing during the cold season and to absorb excessive moisture. Any foreign plant to be tried for its hardiness in our own region should be planted in its permanent place in early season. It will give the root system a chance to take a good hold in the ground, and the plant will be better able to fight its way through the first winter. After the second and third winter the roots of the plants are firmly established in the ground and the plant may be called safe. Even if the top should be killed to the ground during a severe frost, the roots will throw out new shoots the following spring. Never dig out the roots of a valuable plant before the first of July. Give the plant a chance and see what it will do. You may save yourself a great disappointment. Keep in mind the time it took, yes, maybe years to get it developed, but it will require only an hour or so to kill it.

The winters in the Puget Sound region are not severe and the temperature seldom goes down below 25 degrees above zero, and then only for a few days. My records show that every fifteenth or twentieth year the winter is more severe and we have more snow. But during the intermediate years your special selection may give you and your friends a great deal of joy and the plant may become fully established with you and feel happy in the new surroundings. (Continued on Page 43)

*Mr. Ludwig Metzger is supervisor of the Drug Garden at the University of Washington, Seattle.

The Arboretum Bulletin

VOL. XII, No. 3 SEATTLE, WASH. FALL, 1949

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Notes and Comment

ONE of the most successful Unit ventures of the year was the attractive Garden Tea given by the Normandy Park "Beachcombers" Unit for the benefit of the Arboretum on August 4.

Approximately 400 attended the party held in the lovely gardens of the Chester N. Reitze estate in Normandy Park. Truly befitting the name "Beachcombers" was the general decorating scheme, with fortune-telling booths, a most interesting driftwood and sea shell display, door prizes of native evergreen shrubs and plants, and the attractive tea table and punch bowl presided over by Unit chairmen and Unit Council heads of the 41 Arboretum Units.

Throughout the afternoon the guests were entertained by songs of the strolling musicians, Jack Kolbach and Jean Herbert.

This project, by such an enthusiastic and new Unit of the Foundation, should serve as an inspiration to all of us interested in promoting our Arboretum.

Especial congratulations for their work should be extended to:

Mrs. Bruce Hunting, chairman of the Unit, who also was in charge of the tea service.

Mrs. Ralph S. Fleming and Mrs. John A. Clark, chairman and co-chairman of arrangements. Mrs. Fleming also had charge of the fortune-telling booths and Mrs. Clark of the driftwood and sea shell display.

Mrs. Russell L. Noble, publicity.
Mrs. A. P. Frederickson, tickets.
Mrs. W. F. Epmeier, decorations.
Mrs. John S. Pankratz, food.
Mrs. E. Z. Gray, parking and equipment.
Mrs. Harold M. Parks, punch bowl.
Mrs. F. J. Nist, grounds, assisted by Mrs. W. G. Tait.

Mrs. H. B. Cunningham, hostesses, assisted by Mrs. Tait.

Mrs. F. J. Nist, transportation.
Malmo Nursery, Bonnell's Nursery, Five Corners Nurseries, Mr. and Mrs. W. F. Epmeier, Campus Nursery, and an Arboretum friend for donation of the door prizes.

Mary Gay Flower Shop, for arrangement of the dish gardens.

Ye Olde Curiosity Shop for sea shells.

Mrs. W. I. Taggert, driftwood. (Mrs. Taggert and Mrs. Clark arranged this very fascinating display.)

Mrs. G. R. Filson, who entered a very lovely arrangement in the driftwood display.

Also assisting were the following friends of members of the Unit: Miss Ann Reitze, Miss Eva Marion Peterson, Mrs. Robert S. Ennis, Mrs. Mitchell Parks, Mrs. J. L. Heathcote, Miss Jean Fleming, Mrs. Thor Edman, Mrs. Harold Jones and Mrs. Fred Neale.

‘ ‘ ‘

Work is proceeding in Woodland Garden, the West Seattle Garden Club's especial Arboretum project. Plans for revision of the Garden, drawn up earlier in the year, call for many new trees and shrubs typical of a woodland garden. The Club recently donated \$400 to the Arboretum to carry out the new plans.

‘ ‘ ‘

The American Rock Garden Society will hold its next annual meeting in the spring of 1950 in Boston, Massachusetts, by invitation of the New England Regional Group.

Mrs. Clement S. Houghton will entertain the members at her home and beautiful garden in Chestnut Hill. Another visit will be made to the Garden in the Woods, which is a wild flower sanctuary and botanic garden at South Sudbury, about twenty miles from Boston.



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A TRIBUTE

IT WAS unfortunately only very recently that we in the Arboretum Foundation were appraised of the death of Mrs. A. S. Black, for many years a member of the Board from Tacoma. We pay a tribute, though late, to her memory, for in the years of her association with us, she became one of the staunch supports in building the Arboretum. There was rarely an occasion when she did not somehow manage to come over to Board meetings or fund-raising affairs; never a time when she could not be counted on to say, "Yes, I'll do it for the Arboretum!" Through her, wide interest was established in the Arboretum, in Tacoma, at first with difficulty, later with enthusiasm, for everyone with whom Mrs. Black worked knew her selflessness, and were aware that if she backed a project it must really be for the good of the community.

She endeared herself to those who were privileged to be associated with her. The contributions in her memory which have been made to the Arboretum Memorial Fund will enroll her among those to whom tribute rightly will be paid in living trees and blossoming shrubs throughout the years.

SMK

‘ ‘ ‘

Autumn Color in Westonbirt Arboretum

(Continued from Page 16)

and like them turns yellow before the leaves fall.

Some of the *Vacciniums* are very fine, but dislike lime in the soil.

Stewartia pseudo-camellia also dislikes lime but is lovely when it turns to a reddish orange. *Oxydendrum arboreum*, the Sorrel-tree, is another lime hater, coloring a beautiful red.

One of the most magnificent shrubs for color is the Japanese *Disanthus cercidifolius*. It is, however, not particularly hardy, and a sheltered place has to be found for it. It is a deep crimson, a wonderful color, especially when the sun shines on it.

Some years ago some *Hamamelis japonica* var. *flavo-purpurascens* was raised from seed. One or two of these seedlings are coloring quite as well as *Fothergilla* does, and are an acquisition. *Photinia villosa* is a good large shrub both for color and fruit.

Of the dogwoods *Cornus Nuttallii* is perhaps the most desirable. *C. Kousa* has been planted in considerable numbers; the color is good but not outstanding. The common dogwood, *C. sanguinea*, planted in large groups, makes a fine sight both in autumn and for its colored bark in winter.

Callicarpa purpurea, *C. Giraladiana* and *C. koreana* are all distinct from anything else in purplish coloring, and are very much admired. Unfortunately *C. Giraladiana* is rather tender and is sometimes killed to ground level in cold winters.

Many of the birches are worth planting for their effect in the autumn, all becoming yellow. *B. Medwediewii* from the Caucasus region is especially good, but seems to be making a very large bush rather than a tree.

Aesculus turbinata, the Japanese horse chestnut, is usually very fine, the rich brown tints most beautiful. *Pterocarya rhoifolia*, the Japanese Wingnut, is also of considerable beauty.

Of the *Berberis* family some of the best are *B. Thunbergii*; *B. Francisci-Ferdinandii*—a selected form of this is very fine; *B. Sieboldii*, and *B. virescens*. These would be more largely planted if they were not so prickly; they are, however, very beautiful when covered with their coral and scarlet berries.

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The Fall Coloration of Nikko

(Continued from Page 21)

also rival each other in beauty. The following are the chief of them:

Viburnum furcatum, *V. Sargentii*, *Kalopanax pictus*, *Acer mono* var. *eupictum*, *Celastrus strigillosus*, *Phellodendron nikomontanum*, *Prunus nipponica*, *P. Ssiori*, *Hydrangea paniculata* var. *floribunda*, *H. petiolaris* var. *cordifolia*, *Cercidiphyllum japonicum*, *Betula nikkoensis*, *B. Ermani* var. *communis*, *Ulmus Davidiana* var. *japonica*, *Salix sachalinensis* and *Populus suaveolens*.

It is noticeable that there is a hot spring with suffocating odor at Yumoto. (See the map sign D.)

In short, as it turns suddenly colder in Nikko, all the trees and shrubs more or less change their colors in fall. There even persimmon or cherry which never has autumn tints in Tokyo entirely put on their color.



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Book Review

The Huntington Botanical Gardens, by William Hertrich. Published by The Huntington Library, San Marino, California, 1949.

THE book—"The Huntington Botanical Gardens"—contains the personal recollections of William Hertrich, now curator emeritus of the Botanical Gardens. The dedication in the front of the book reads, "This volume has been printed by order of the trustees of the Henry E. Huntington Library and Art Gallery as a tribute to William Hertrich on completion of forty-five years of service as Superintendent of the estate of Henry E. Huntington and as Curator of the Huntington Botanical Gardens."

It is a beautiful and interesting book—beautifully compiled, beautifully printed and full of beautiful illustrative photographs.

As a young man in 1903, William Hertrich set out from New England to visit an uncle who lived on a ranch in California. He had completed ten years training in agriculture, horticulture and landscape gardening and accepted positions as landscape gardener and assisted in planting several gardens in Los Angeles.

In 1904 he was engaged as landscape gardener for the San Marino Ranch which Mr. Huntington had decided to develop as his California home.

A nursery was started to produce some of the material needed for mass plantings and in a few years contained over 15,000 plants. Seventy-five to one hundred-foot redwoods now growing in the botanical gardens were seedlings in the nursery in 1905.

Lily ponds were constructed with hot water pipe heating to extend the flowering season of tropical species. Several water systems were installed until finally sufficient water was available for the extensive establishment.

Mr. Hertrich assembled about 148 species of palms in spite of many losses over the years due to unfavorable weather conditions. Mr. Hertrich and Mr. Huntington also were always much interested in the trees—especially the palms and the oaks, and many of the wonderful oaks which are such an attraction in the Gardens today owe their lives to the expert tree surgery done at Mr. Huntington's suggestion. Extensive and remarkable feats were performed in transplanting large trees before the age of motorized equipment.

The book is full of the personal experiences of Mr. Hertrich and his work as it grew under Mr. Huntington and he goes into much detail as to materials and expenses in the different projects. The private residence, the library, the mausoleum, the art museum with all its treasures, and the whole growth of the estate from private ownership to public institution is dealt with in a clear and interesting way.

This is the first edition of the work of which 1000 copies have been printed. The University of Washington Arboretum's library contains copy number 263.

MRS. PHILIP SMITH

Trees of Mount Rainier National Park. By C. Frank Brockman. University of Washington Press, Seattle (1949). Price 75 cents.

THIS 49-page booklet with stiff green paper covers describes not only the trees within the confines of the Park but also those found along the approaching highways.

The introduction describes the various forest zones. Under the heading "Enemies of the Forest" appears the statement that man and his activities are one of the enemies: man is responsible not only for fires, but in campground areas contributes to the decline of the forest by packing soil around the base of trees.

Following the introduction the individual species of each genus found in the Park is described. Exact locations in the Park are noted and the final paragraph of each description gives the western range of the tree under discussion. Many beautiful mountain scenes add to the reader's pleasure, and throughout are pictures of details of foliage and cones to enable quick identification.

A particularly interesting field key accompanied by explanatory sketches winds up the booklet. This key has all the fascinating earmarks of a self-conducted quiz. With this booklet in one hand and a specimen branch in the other, identification of forest trees by any amateur should be easily achieved.

One feels that this able writer has observed keenly in the area he so accurately describes, and that he has acquired a deep fund of scientific knowledge which he passes on in an easy and delightful style.

—BETH GILLEY MALMO

1 1 1

New Designs of Small Properties. By M. E. Bottomley. The Macmillan Co., New York, 1943. Price: \$3.75.

THIS revised edition of "The Design of Small Properties," published twenty years ago, fills a need of the changing times, especially the trend of the design of the modern garden.

The chapter on "Landscape Design In A Modern Manner" will answer many questions regarding modernistic landscaping. But whatever the change of garden style, the important thing to remember is that the principles remain sound as they do not change.

The discussions and illustrations of Chapter 1, "Planning for Small Properties," are excellent and well worth the price of the book for this chapter alone.

"A Basis for Planting Compositions," given in the last chapter also is very worthwhile for it answers many questions on topics such as enframement and enclosure, balance in planting, types of plants, interrelation of plants and making the planting plan.

Throughout the book there are many sketches which bring clearly home a point or principle outlined in the text. However, it appears that many of the plan illustrations tend to severeness, and are not practical to the average home owner who does his own garden upkeep. Intricate designs with fussiness are not adaptable to the average gardener who is limited in time for maintenance.

The reader must realize that no matter what books one reads or pictures are observed or educational courses taken in relation to landscape design, the underlying rule that the plan must fit the surroundings never changes. The plan is based on the limitation of the individual piece of property and the surrounding neighborhood. The practical requirements of the lot and the individual interest of the home owner, plus the initial cost and future maintenance costs, are the prerequisite considerations. Rarely will a preconceived design plan meet these practical requirements. Those in this book merely serve as a basis of ideas.

—ROBERT J. HANSEN

1 1 1

Lily Year Book, 1948. Published by the Royal Horticultural Society, London. Price: 8/6 (\$1.70)

THE Royal Horticultural Society has recently issued the *Lily Year Book* compiled by the Lily Group of the Society. It is an interesting factual work which will be of great help to all who grow lilies.

Following the foreword by the Group's president, Colonel F. C. Stern, is a reprint of a lecture by Mr. F. J. Rose, entitled "Lilies for Beginners." He describes in detail the sixteen sorts which he considers easy of cultivation, and practically all of the lilies on his list are also considered "easy" in America. He does not approve of any lily plantings in herbaceous borders, but suggests shade-loving plants as suitable companions, such as ferns, rhododendrons, etc.

An article by the eminent grower of lilies, Mr. W. A. Constable, brings word of some new varieties. These have been collected by Dr. Rock, in China, and reached Mr. Constable by way of Alan MacNeil of Sandy Loam, Vermont. There were bulbs as well as seed, and some of the bulbs received in 1947 bloomed in 1948.

The work of Americans and of Canadians has been given much credit in the *Year Book*. In this connection an article by Mr. George L. Slate of Geneva, New York, entitled "Lilies and Fertilizers," will be thoughtfully read, probably more than once. Other articles are "American Research on Virus Diseases of Lilies," from the Bureau of Plant Quarantine at Beltsville, Maryland; "Studies of Pacific Coast Lilies," by Alice Eastwood, and "Key to Eastern North American Lilies," by Edgar T. Wherry. Also an article by Isabella Preston relating impressions of visits to lily gardens in England during a recent trip.

An interesting report of a discussion relative to the root systems of lilies by the Group, is most informative. In the true British fashion it is a *discussion*, and deals with such controversial subjects as use of hormones and fungicides, and since it is an account of actual experiences of members, it might be termed almost exciting. This is also true of a chapter called "Lily Notes," a compilation of correspondence from members, and others interested in lily culture.

"The Generic Concept with Reference to Fritillaria," from Kew Botanic Gardens, is followed by another article on Fritillaria, by a Group member, Miss C. Beck. These will be of interest to those who are growing such bulbs, many of which are native to our Pacific Northwest.

There are many other interesting accounts of various phases of lily culture in the *Year Book*.

An obituary to the memory of Mr. William N. Craig of Weymouth, Massachusetts, pays high

tribute to the work of this notable horticulturist.

The illustrations are numerous and good, as are the line drawings accompanying the more technical articles. We ordinary gardeners owe much to these amateurs and specialists whose untiring efforts bring to us constantly better plants, and better methods of culture.

A splendid index covering this and the other eleven issues preceding it has been compiled at Wisley. It covers completely all of the subjects to be found in these publications, and is, in fact, the only unsatisfying part of the book, since reading the index makes the reader want every single issue!

—SALLY BUNGE

1 1 1

Flowers in Winter, by Patrick M. Synge, Lindsay Drummond Ltd., London, England, 1948. Price \$2.10.

PATRICK M. SYNGE'S "Flowers in Winter" is a most delightful book and a "must" for all who live in the Pacific Northwest where the climate is so similar to much of England.

All gardeners are familiar with many flowers and shrubs that bloom during our soft winter months—the hellebores, jasmines, *Camellia Sasanqua*, *Hamamelis mollis*, *Sarcococca Hookeriana*, some of the Viburnums, heathers, *Iris stylosa*—perhaps we can list two dozen easily. Mr. Synge writes of some four hundred and forty. Four hundred and forty winter bloomers for this climate; surely here can be found inspiration, wonder and delight. Of his long list a few—a very few—are of doubtful hardiness here. the Acacias for instance. Also even in his long list I am sure the student or the horticulturist will find some missing names. He makes no mention of *Lewisia brachycalyx*, that hardy February harbinger of spring.

The book is generously illustrated with fifty-two beautiful plates, with some in color to add to the interest. It is written with enthusiasm and affection as well as knowledge. Occasionally a bit of plant lore: "Gerard cultivated the *Daphne Mezereum* as long ago as 1597 and writes that he received the seed from Poland, possibly through a trader of the Hanseatic League." He prescribes the berries as a cure for drunkenness, stating: "Also if a drunkard do eat one grain or berry of this plant, he cannot be allowed to drink at that time, such will be the heat of his mouth and choking in his throat."

Mr. Synge traces many of the plant families to their original homes in China, Tibet, the Greek Mountains, Asia Minor; it is interesting to note how much of the world can "grow round our door." He speaks of the earliest flowering rhododendrons and camellias, of two camellias in particular that he says are almost equal to *Camellia reticulata* in size and charm.

I think that you cannot read this book and not want to add to your garden more of the winter blooming lovely things—perhaps even adding enough so that you can say with pride, "Mine is of course a winter garden."

V. Sackville West in "the Garden" says:

"And these are signs of spring, that
spurious spring

That comes in February to astound
And, against reason, make our hearts
believe."

And that's important.

—MRS. DEAN BALLARD

The Beautiful Cornus Family

(Continued from Page 9)

William Bartram, son of John Bartram, in his *Travels in Georgia and Florida*, published in 1791, who gives a glowing account of these lovely trees growing near the banks of the Alabama. Catesby, another early plant explorer, in describing *C. florida* says, "the blossoms break forth in the beginning of March, being not so wide as a sixpence, but increasing gradually to the breadth of a man's hand, being not to their full bigness until about six weeks after they open." This description of the size of flowers might well apply to *C. Nuttallii*. The involucre of *C. florida rubra* is pink and varies in depth of color in various trees, some lighter, some darker.

There is a double flowering form of *C. florida*, also a weeping form, both of which are increased vegetatively.

C. Kousa and *C. Kousa chinensis* are two very desirable forms coming from Asia, ranging from East China through Korea and Japan. *C. Kousa*, the Japanese form, develops into small trees and blooms in mid-June; the blooming season lasting several weeks, thus prolonging the season of the *Cornus* family from early winter to midsummer.

The white flower bracts of *C. Kousa* are narrower and more sharply pointed than those of *C. florida* and turn a beautiful pink as they age. The shapes of seedling trees vary; of the five we have grown from seed, four have sharply pointed bracts while those of the fifth are rounded. It is difficult to say which is more beautiful. The red strawberry-

like seed pods are very different from those of the American species. The seed fruit contains usually a single seed, sometimes two, which, if planted soon after maturity, germinates readily. The leaves are smaller than those of the North American species and in autumn turn a brilliant deep red.

The variety *C. Kousa chinensis* was introduced by Mr. E. H. Wilson in 1907, who says of it, "the Central China type, var. *chinensis*, has been my privilege and good fortune to add to gardens. In this form the bracts are larger and broader and often overlap to form a closed flattened involucre around the button-like mass of real flowers. Some experts claim this is the finest gift of China to Western gardens." In these forms the bracts unfold after the leaves have appeared.

Another Asiatic form, the only evergreen of the genus, *C. capitata*, originates in South China, thence on to the Himalayas, and is sometimes known as the strawberry tree. It has rather thick leathery leaves of the dogwood type and takes on no color in the autumn. The green leaves remain on during the winter, falling sometime during the spring and summer. The flower bracts are pale yellow, passing to creamy white while expanding in June and July. Coming from so warm a climate, it is suited only to a warm climate. We have one purchased in Santa Barbara, California, when it was flourishing and had produced red fruit. The first year, in our garden, it was frozen to the ground, but came again from the roots and has grown to be a great bush of many stalks at least fifteen feet high. It has not, in the five or six years,

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produced any flowers. Last winter's (1948) freezing weather seemingly did it no harm.

Without doubt, there is no more beautiful native flowering tree in Western North America than *C. Nuttallii*. It attains a much greater height than *C. florida*, 60 to 80 feet in favorable locations, and the flower bracts are also much larger. It is usually found growing happily on banks of sandy loam where the drainage is sharp and where no water is given during the summer months. An ideal location is on sunny hillsides, or on mountain slopes or in well-drained valleys. It reaches its greatest growth in the Douglas fir forests of the Puget Sound country and in the redwood region of Northern California. *C. Nuttallii* is found along the entire Pacific coast from British Columbia to California. It is not hardy enough to grow in other parts of the U. S. The seed clusters turn a beautiful red in autumn and are eaten by birds and squirrels. The leaves turn to shades of crimson and gold before falling. Its wood, like that of all other dogwoods, is hard and durable.

The following list covers those to be found in the University of Washington Arboretum:

<i>Cornus alba</i>	
<i>alba sibirica</i>	<i>Nuttallii</i>
<i>Arnoldiana</i>	<i>Nuttallii</i> var. <i>Eddiei</i>
<i>Baileyi</i>	<i>occidentalis</i>
<i>capitata</i>	<i>obliqua</i>
<i>florida</i>	<i>poliophylla</i>
<i>florida rubra</i>	<i>pubescens</i>
<i>glabrata</i>	<i>racemosa</i>
<i>Kousa</i>	<i>sanguinea</i>
<i>Mas</i>	<i>stolonifera flaviramea</i>

Do you patronize the BULLETIN advertisers? When you buy, say that you saw the ad in THE ARBORETUM BULLETIN!

Following our usual practice, the winter number of the BULLETIN this year will be devoted to one group of plants, namely conifers, so successful and popular in gardens of the Northwest.

Authoritative articles are already promised on Conifers cultivated in the Eastern U. S. A., with a special contribution on the famous Hunnewell collection in Massachusetts, on those native to our own Cascade Mountains, and to California, and those suitable for the rock garden. We hope also to have accounts of the many species flourishing in some of the gardens of Ireland and Scotland, as well as others informing us on different aspects of these universally grown trees.

In order to illustrate this important issue adequately, the Editorial Board would welcome contributions from interested garden clubs or individuals in order to provide more than our usual small quota of photographs. Good pictures can be obtained, but the cost of production is high, ranging up to \$25.00 for a full page plate. Any sum from \$5.00 upward would be very welcome for this especial purpose, and should be sent to the Secretary of the Arboretum Foundation, or to Mr. B. O. Mulligan, at the Arboretum.

1 1 1

Recently received: A set of seven volumes of *The New Flora & Silva*, starting with the original issues in 1928. This valuable donation came from the Lake Washington Garden Club Unit II. Also included is a volume of *Hardy and Half-Hardy Plants*, a magazine of illustrations and descriptions of plants. Both are British publications.

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Recent Developments and Improvements in Cultivated Plants

(Continued from Page 13)

prolific productivity, disease resistance and thin-shelled fruit makes it a desirable variety.

7. Sport of the yellow Newton apple has long fruit spurs which easily separate from the fruit in picking. This enables the pickers to harvest a much larger volume of marketable apples and also to preserve the spurs for the next season's crop.

8. A magnolia plant which resembles *M. stellata* but flowers are larger and double. They are deep rose pink on the outer side of the petals while the inside is white suffused with a delicate pink at the tips. It is late flowering and has an extended blooming season.

9. A low-growing dwarf form of Japanese holly.

10. Nectarine plant with an all-over red-skinned fruit which is also red near the pit. It is reported to be a good producer.

Only a few of the most recently patented plants are mentioned above. As many as 853 plants have been patented since 1931. The reader is referred to the list of U. S. patents for further information.

As far as forest genetics goes, the field has barely been scratched. The Institute of Forest Genetics, Placerville, California, has initiated a program on pine breeding. The aim of the Institute is to produce more vigorous hybrids resistant to disease.

In 1924 the Oxford Paper Company in co-operation with the New York Botanical Garden started a comprehensive project in the

hybridization of poplars. The primary purpose of this work was to produce new poplars valuable for pulpwood reforestation. Many of the new hybrids appear especially promising because they surpass the older hybrids in habit and rate of growth and resistance to disease and climatic conditions.

In 1930 the Brooklyn Botanic Garden sponsored a project for the breeding of chestnuts to produce hybrids that would combine good forest form with immunity to the chestnut blight. Some of the hybrids that have been developed exhibit these characteristics.

Extensive work on larch hybridization has been carried out and it seems probable that all species are interfertile. Several of the hybrids are valuable not only on account of their combining desirable features from both parents, but hybrids are disease, pest, and drought-resistant and winter hardy.

Approximately 80 interspecific combinations have been made within the oaks and about 85 interspecific combinations have been reported for the willows.

Hybrids have been recorded for the following genera though the genetical work has been less intensive: *Abies* (fir), *Cupressus* (cypress), *Juniperus* (juniper), *Picea* (spruce), *Tsuga* (hemlock), *Acer* (maple), *Aesculus* (horse chestnut), *Alnus* (alder), *Betula* (birch), *Carya* (hickory), *Eucalyptus*, *Fraxinus* (ash), *Ilex* (holly), *Juglans* (walnut), *Platanus* (plane), *Robinia* (locust), *Tilia* (linden), and *Ulmus* (elm). For discussion of recent genetical work on forest trees the reader is referred to Schreiner (1937) and Richens (1945).

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Considerable genetical work has also been done on fruit and nut trees, but these will not be discussed at this time. The science of plant improvement is still in its early stages of development. Very few new vines have been developed. Little work has been done on shrubs. A field which is wide open for experimentation is a study of our winter flowering shrubs. The Handbook of Rhododendrons lists over 800 varieties of rhododendrons. Of the 780 species here described only about 144 have been used by hybridists. We can certainly expect more and possibly better hybrids in the future. Though there are numerous varieties of camellias described, there are many possibilities here for the hybridizer. With the newer methods for the induction of polyploidy, we may expect many new hybrids in roses, iris, lilies, gladioli, rhododendrons and other popular groups of flowering plants. There is a great need for trees which will grow on rough hilly lands unadapted for cultivation. Plants such as our native persimmons, papaws, elderberries and hawthorns might well be improved not only for human good but also for hogs, sheep and poultry.

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ARBORETUM NOTEBOOK

This department is published for correspondence and pertinent comments by experienced growers on interesting plants and their culture. We solicit your questions but space limitation necessitates the publishing of only such answers as we deem of general interest.

LAYERING the branches of established plants of the large-flowered clematis hybrids is an easy and practical way to increase the size of your plants, and this method will give you rooted divisions to share with friends. This practice will make thicker and more beautiful foliage growth from the very base, and avoids that long, ugly, naked lower stem which is so often seen in older plants that have not been layered. If layering is done for several successive years, and no divisions removed, you will be amazed at the new beauty which your plant develops. A layered plant may be a few days later coming into bloom, but this slight disadvantage is more than offset by a plant that will be much handsomer throughout the growing season.

Early November is a good time to do it. In fact, my favorite day is Armistice Day, November 11, but I have done it successfully as late as mid-January. However, my best luck has been with November layering. In this vicinity the furry leaf buds become active very early in the year, often showing green leaf growth in January, and for that reason I think November layering is best.

Carefully take the plant stems down from the support, but do not sever from the root. If you wish the new growth to cover a long narrow space, as along a porch, simply dig a long narrow trench and lay the branches in it. Cover all of the dormant growth with three or four inches of soil. If you merely want thicker growth exactly where your large-flowered clematis is planted, the dormant vines may be coiled in the hands, like a wreath, and laid in a shallowly scooped-out spot in front of or encircling the main stem, then cover completely with three or four inches of soil. If heavy winter rains expose the layered branches, cover with more dirt. Every dormant branch, in fact every part of the clematis must be beneath the soil. New shoots will not spring from every node but there will be several separate shoots popping out of the ground in March and April. About mid-June roots form at the base of each growing stem and if the new plants are to be separated from the mother plant, this is not done until the plant is again dormant.

Layering is suggested only for the large-flowered hybrids, such as the purple *Jackmani* and the white *Henryi*, not for the small flowered species like *C. montana*; this roots readily from internodal cuttings taken in middle to late May, as the plant is in flower or just going out of bloom.

Remember that Clematis like lime, they appreciate a rich, deep soil and in the growing season they are always very thirsty.

—the filmy grace of *I. gracilipes*, from the cleared upland coppices of Japan, where it grows as primroses grow in a Kentish clearing, all the hillside covered with its dancing 5-inch sprays of wide-winged delicate butterflies in the tenderest crumpled silk of pale-blue, with beard and enrichments of gold, and a pale veined eye—the most perfectly fairylike of its race, so that one feels that it is indeed a-flutter for its final

flight. Yet in the garden in light woodland soil, not overhung, but sheltered from the excess of sun and rain and wind, *I. gracilipes* at the fringe of small low shrubs, remembers the Thousand Islands of Matsushima, and flutters gaily in a garden many thousands of miles away.” Reginald Farrer in the English Rock Garden. Very little is left to say about *Iris gracilipes* after reading Mr. Farrer’s description. *Iris gracilipes* belong to the same series of *Iris* as *I. cristata* and *I. tectorum*. The leaves, an exquisite shade of green, form fan-like sprays with a quality more delicate than most other irises, suggestive, perhaps, of some grasses. They begin to bloom in May and carry on for a full month. This is not a plant, I think, for the casual gardener, although, if it finds a spot to its liking, it will stay for years. Slugs are particularly fond of its leaves and flowers and if not carefully protected it may disappear completely.

There are not many blossoms more chaste than those of our native syringa, if the plant is pruned properly. Every year, from the very first year of blooming, immediately after the blossoms have silted, remove every branch that has bloomed and all other branches necessary to keep the plant in a graceful form and confined to its allotted space. You will be rewarded by much larger blossoms.

If you wish your helleborus, species cyclamen, *Delphinium chinense*, etc., to self sow, cultivate enough sand into the soil around the plants so the weeds may be pulled with little disturbance. Before the seed is ripened, hairpin the seed pods close to the soil. The really important thing then is to let them alone, excepting the careful removal of weeds.

E. H.

Planting *Nicotiana* (Tobacco Plant) among rhododendrons gives blooms throughout the summer. The new hybrids have many unusual, subtle shades and the fragrance is not the least of its charms. They are easily raised from seeds.

B. G.

Mrs. Claude Stockdale, a grower of delphiniums on Bainbridge Island, wrote to Vetterle and Reinelt, who have their hybridizing gardens at Capitola, California, and where she has been purchasing seeds for many years, for answers to several of her problems. The following letter from Mr. Frank Reinelt may be valuable to many growers of delphiniums.

“Dear Mrs. Stockdale:

“In reply to your kind letter, I can find an answer to some of your questions.

“(1) Malformation of some flowers, resembling club heads, is due to overfeeding, but it is also an inheritable character, which I have seen trying to weed out for years. If the plant only throws one spike and the rest are normal, it is due to too heavy content of nitrogen. If they all come that way you might as well discard it.

“(2) Spikes with missing flowers is also inherited and should be discarded.

“(3) I would suggest that you thin out the shoots appearing in spring to whatever you desire to have. Six would be about the limit I would leave on, as less spikes make finer spikes. The more you leave on, the smaller the flowers.

“(4) Do not divide your old plants, as they have a tremendous root system and, even if you are successful in dividing it would take years before they would recover and give you the same show. It is much simpler to raise plants from seed, selecting the plants you want and transplanting them into permanent location where you can leave them undisturbed for years.

“(5) As far as fertilizer is concerned, I would suggest heavy application of bonemeal, chopped into the ground around the plants in late winter or early spring. This has very little nitrogen and very heavy phosphorus, which gives you strength. The height of the plants is governed by the amount of water they get. In your locality, with your rains, you will have always tall delphiniums. With kind regards,

“Sincerely yours,
“FRANK REINELT.”

It is strange that so handsome a plant as *Bocconia cordata* is so seldom seen in our gardens. It's common name is Plume Poppy, but, although it belongs to the poppy family (*Papaveraceae*) there is very little to remind one of poppies. It grows tall, six to eight feet in height, and the flowers small and without petals are borne in large plummy masses above very handsome, heavy foliage. The leaves are not unlike over-sized blood root leaves, heart-shaped and glaucous. After rain or watering globules of water float over the leaves in a charming manner. It is very interesting at the back of a border making an unusual contrast to the surrounding foliage. It is fine among shrubbery and may be naturalized in an informal planting. The leaves and the panicles of blooms should be particularly valuable in flower arrangements. It grows well in only fairly rich soil but in rich soil it is a distinguished plant.

1 1 1

List of Plant Names—Continued

Babiana	said to be Dutch for baboon because those animals feed on the bulbs
<i>babylonicus</i>	Babylonian
<i>baccans</i>	berried
<i>baccifera</i>	berry bearing
<i>Bachii</i>	after Mons. Bach
<i>bacteriophilus</i>	bacteria-loving
Baeria	after a Russian Zoologist, Karl von Baer
Baileyi	after Lt. Col. F. M. Bailey
<i>balearicus</i>	of the Balearic Islands
Balfourianum	after Sir Isaac B. Balfour
<i>balsameus</i>	balsamic
<i>balsamifera</i>	balsam-bearing
Balsamorrhiza	Gr. balsam root
<i>balticus</i>	of the Baltic
Bambusa	bamboo
<i>bambusoides</i>	bamboo-like
<i>banaticus</i>	of Banat
Banksia	after Sir Joseph Banks, famous English scientist
Barbarea	old name, Herb of St. Barbara

<i>barbarus</i>	foreign
<i>barbatus</i>	barbed, bearded
<i>barbigera</i>	bearing barbs or beards
<i>barbinervis</i>	nerves bearded
<i>barbulatus</i>	small bearded
Barosma	heavy scent
Barringtonia	after Daines Barrington, English naturalist
Basella	native Malabar name
<i>baselloides</i>	basella-like
<i>bavaricus</i>	Bavarian
Bauhinia	after Bauhin brothers, 16th Century
Beaufortia	after Duchess of Beaufort
Beaumontia	patron of botany
Beesianum	after Mrs. Beaumont of England
Begonia	after Messrs. Bees, nurserymen
<i>beimaense</i>	after Michel Begon, San Domingo
Belamcanda	from Beimashan, a mountain in China
<i>bellidioides</i>	East Indian name
Bellis	bellis-like
Bellium	Lat. bellus, pretty
<i>bellus</i>	from its resemblance to Bellis. Daisy
Beloperone	handsome
<i>benedictus</i>	referring to arrow-shaped connective
Benincasa	blessed
Benzoin	after an Italian nobleman of Arabic or Semitic origin
Berberidopsis	from berberis and Gr. opis, likeness
Berberis	Arabic name
Bergerocactus	after Alwin Berger, Italy
Bertholletia	after Claude Berthollet, French chemist
Bessera	after Dr. Besser at Brody
Beta	ancient name
<i>betaceus</i>	beet-like
<i>betonicaefolius</i>	betonica leaved
Betula	ancient Latin name
<i>betulaefolius</i>	birch-leaved
<i>betulinus</i>	birch-like
Bidens	Lat. two teeth, referring to awns
<i>bicarinatus</i>	twice keeled
<i>bicolor</i>	two colored
<i>bicornis</i>	two horned
<i>bidentatus</i>	two toothed
<i>biennis</i>	biennial
<i>bifidus</i>	cut twice
<i>biflorus</i>	two flowered
<i>bifolius</i>	two leaved
<i>biformis</i>	of two forms
Bifrenaria	Lat. twice and strap, referring to two stalks of the pollinia
<i>bifrons</i>	two fronded
<i>bifurcatus</i>	twice forked
<i>bigibbus</i>	with two projections
<i>biglumis</i>	two glumed
Bignonia	after the Abbe Jean Paul Bignon
<i>bignonioides</i>	bignonia-like
<i>bijugus</i>	yoked together
Billardiera	after J. J. Labillardiere, French botanist
Billbergia	after J. G. Billberg, Swedish botanist

(Continued on Page 42)

Further Notes on Frost Damage in the Arboretum January-February, 1949

B. O. MULLIGAN*

THE Spring issue of THE BULLETIN contained some preliminary records of damage to plants in the Arboretum by low temperatures during January and February, 1949. (See pp. 36, 44, and for figures of temperatures and precipitation, p. 1.) The following notes amend or supplement this earlier report, and follow the same order.

The young plants of *Acacia* all died or were so badly crippled as to be useless; shrubby Lupins were likewise killed. In the *Cistus* collection only *C. salvifolius* and *C. villosus* var. *prostratus* succumbed, although one plant of the latter survived. *C. ladaniferus* var. *albiflorus* received little damage, but was evidently near its limit of resistance; *C. purpureus* was not affected. *Halimium* species stood the test very well.

Magnolia grandiflora. One plant in the open about six feet tall was killed back to the base of the main branches; others nearby suffered some scorching of the leaves but have now recovered.

Rhododendrons. As previously noted, damage to established plants was negligible, but in the nursery and lath-houses several species of the *Maddeni* series were either killed outright or to ground level; these comprised *R. Taggianum*, *R. megacalyx*, *R. Scottianum*, *R. Lindleyi*, and some plants of *R. supranubium*. Others affected somewhat less severely were *R. argenteum* (small plants), *R. xanthosteph-*

anum (aureum), and the hybrid "Cornubia," this last in a particularly low-lying situation. Young plants of *R. Kyawi* in the lath-house came through unscathed, as did *R. odoriferum*.

Of the three young specimens of *Hoheria glabrata* var. *Osbornei* on the south bank of Rhododendron Glen one survived more or less unharmed—the other two had to be removed and replaced.

Ceanothus. *C. papillosus* was severely damaged, one plant being killed, the other two losing all their upper branches. *C. purpureus* has recovered well from a scorching of the foliage. On the south side of the greenhouses *C. griseus* var. *horizontalis* looked very unhappy also for some time, but has now made fresh growth.

As suggested earlier these latter borders contained most of our casualties; dead are *Adenocarpus foliolosus*, *Beschorneria yucoides*, *Calceolaria integrifolia* (*C. violacea* nearly so also), *Campanula Vidalii*, *Correa magnifica*, *Hypericum balearicum*, *Leptospermum scoparium* var. *Nichollsii*, and var. *roseum multipetalum*, *Lippia citriodora*, *Lavandula dentata*, *Protea lanceolata*, *P. lacticolor*, *P. longiflora*, *P. cynaroides*, and *P. melifera* (these despite the extra protection of frame lights and bracken), and *Vinca difformis*.

A good specimen of *Fremontia californica*

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8-9 feet high was killed to the ground and is unlikely to form a shapely plant again. Some recoveries here after apparent destruction were *Agapanthus orientalis* and *A. Weiligii*, *Diplacus aurantiacus* hybrids, *Oxypetalum coeruleum*, *Swainsona galegifolia*, and *Teucrium fruticans*. One plant of *Protea latifolia* survived under protection.

In the lath houses we lost *Lapageria rosea*, and young plants of the following: *Dacrydium cupressinum*, *Desfontainea spinosa*, *Escallonia montevidensis* and the recent hybrid of *E. macrantha* named "Eric Walther," *Cytisus* "Porlock", *Magnolia Delavayi*, *Peumus Boldus*, *Pomaderris elliptica*, *Podocarpus ferrugineus*, and *Widdringtonia dracomontana*.

Most plants in a short row of *Juniperus bermudiana* were killed but a few were alive in the lower half. Cut to the ground here were a number of Chilean evergreens—*Berberidopsis corallina*, *Eucryphia cordifolia*, *Mitraria coccinea*, *Quillaja Saponaria*, and *Tricuspidaria lanceolata*; most of these will have to be re-propagated to obtain good plants.

Eucryphia nymansensis and *Rhododendron*

scabrum were scorched in foliage but are recovering, like the California Toyon, *Photinia arbutifolia* var. *macrocarpa*.

Some losses occurred in a low-lying area of the nursery; these were killed: *Comarostaphylis* (*Arctostaphylos*) *diversifolia*, *Feijoa Sellowiana*, *Hebe elliptica variegata*, *Senecio laxifolius* (only slightly damaged against a wall), and *Tricuspidaria dependens*; *Ilex Cassine* had all upper parts of the plants killed.

In the *Arctostaphylos* collection only *A. Hookeri*, a nearly prostrate species from the coast of central California, was entirely killed; the white-leaf Manzanita, *A. viscida*, was considerably damaged but is recovering.

One other item worth mentioning is the hybrid *Eucryphia intermedia*, of which several young plants (but not all) about 4 feet high lost most of the upper part of their growth of the previous season. These plants were on a steep west slope heavily shaded by maple trees, and were not expected to have been so hardly hit; the reason was probably soft unripened growth due to excessive rainfall in 1948, and the dense shade.

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Fall Coloring — Seattle

(Continued from Page 23)

presented to Roman brides in congratulations.

Among trees and shrubs not to be forgotten are *Euonymus* of varied kinds; *europaeus*, the spindle tree, interesting in fall when laden with rose pink fruits; *latifolius*, which grows 10 to 15 feet, especially beautiful with rosy red fruit hanging on three-inch threads, persisting for some time after the fall of the dark red foliage.

Pyracantha (Firethorn) adorns many a chimney with either orange or red berries.

Enkianthus, deciduous shrubs from Asia, produce Lily-of-the-Valley-like flowers in May with very attractive tinted foliage in autumn.

Clerodendron trichotomum, or *Fargesii*, attains a height of 10 feet. The star-shaped, white and fragrant flowers come in August and are succeeded by porcelain blue fruits.

Stewartia (*Stuartia*), deciduous shrubs or small trees of great beauty flowering in July and August when few other shrubs are in blossom. The flowers are creamy white and cup-shaped. The foliage later turns yellow and red.

Spiraea prunifolia plena, from China, 4 to 6 feet, is one of the finest. In spring the tender shoots are smothered from end to end with double white flowers. In autumn the foliage is richly colored.

The year round one may enjoy *Erica* (Heath). It is a large family. *Ciliaris* is rich clear pink from July to October; var. *Ma-weana*, smothered with globular rosy crimson blossoms; var. *Stoborough*, cream colored aging to pearl. *Daboecia*, 12-18 inches, with large bell-shaped white to purple flowers, in great profusion from June to November, charming as a bed edging and useful for indoor decorations. As a ground cover our native Kinnikinnick (*Arctostaphylos Uva-ursi*) with its autumn berries cannot be surpassed.

The familiar Virginia Creeper adorns many walls with its gorgeous coloring, as well as *Clematis paniculata*, of which the small white

flowers in September and October quickly change to attractive fluffy seeds.

The peony is only thought of in spring but its autumn foliage coloring is charming.

The Alpine Strawberry, aside from its delicious fruit, makes a delightful edging plant with soft bronzy-red colored foliage. Belle de Meaux and Common White are the best.

So much has been written about herbaceous borders and such excellent plans devised, it is hardly necessary to enumerate the flowers of fall. However, dahlias alone give a crescendo of color and with *Helenium*, Michaelmas daisies, *Rudbeckia*, *Statice*, Gladioli, a new *Hemerocallis* (Aug. Pioneer—cream-orange with back petals delicate red—blooms middle of August to October), the Sunflower family, Asters and Chrysanthemums, one's border need not look shabby. *Geranium ibericum* with masses of violet-blue flowers in May and June, while the foliage, ornamental at any time, later turns a brilliant red.

Prunus subhirtella autumnalis, with its pale pink flowers produced intermittently from November to April, tempts one to enumerate several plants and shrubs to enjoy during the winter, but it is hoped you may agree in part, at least, with the old Chinese saying—

"If you would be happy for three hours,
Get drunk—

If you would be happy for three days,
Kill a pig and eat it.

If you would be happy for three months,
Get married.

If you would be happy your whole life long,
Become a gardener."

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Autumn Color—How It Comes About

(Continued from Page 18)

matic conditions, but many of the plants with red fall foliage will be striking in appearance only when warm, sunshiny days prevail, followed by nights with temperatures below 45 degrees F. The sugar formation in the leaf, the amount of sunshine received by the plants, and the temperature of the air are three variable factors which to a large degree control autumn coloration.

The following lists include some of the ornamental woody plants which are valued for their autumn color in the Northeastern United States.

Autumn Color—Red

Acer ginnala	Pyrus communis
— rubrum—red and yellow	Pyrus pyrifolia
— rubrum schlesingeri—	— ussuriensis
very early red	Quercus borealis maxima
— saccharum—	— coccinea
red and yellow	— palustris
Berberis—many species	— velutina
Cornus alba	Rhododendron vaseyi
— florida	Rhus aromatica
Cotinus americanus	— copallina—shining red
— coggygria	— glabra
Cotoneaster divaricata	— radicans—red and yellow
Crataegus phaenopyrum	— typhina
Enkianthus campanulatus	Rosa rugosa—red and yellow
— perulatus	— virginiana—red and yellow
Euonymus alata	Sassafras albidum—
— sachalinensis	red, yellow to orange
Fothergilla species—	Spiraea prunifolia—
red and yellow	glossy red
Liquidambar styraciflua—	Syringa oblata dilatata
red and yellow	Vaccinium species
Nyssa sylvatica	Viburnum dentatum
Oxydendrum arboreum	— lantana—deep red
Parthenocissus quinquefolia	— prunifolium
— tricuspidata	— tomentosum—
Prunus sargentii	velvety, dull red

Autumn Color—Reddish to Reddish Purple

Cornus racemosa	Malus sublobata
Fraxinus americana	Pachistima canbyi
Gaultheria procumbens	Quercus alba
Gaylussacia brachycera	Thuja occidentalis ericoides—
Juniperus horizontalis	purple
plumosa	Viburnum acerifolium
Leucothoe catesbaei	— dilatatum
Mahonia aquifolium	— lentago
— repens	

Autumn Color—Yellow

Acer pennsylvanicum	Ginkgo biloba
— platanoides	Hamamelis mollis
Amelanchier species—	— vernalis
yellow to red	— virginiana
Asimina triloba	Larix decidua
Betula species	— laricina
Celastrus species	Lindera benzoin
Cercis canadensis	Liriodendron tulipifera

Cladrastis lutea—
yellow to purplish
Clethra acuminata
— alnifolia

Phellodendron amurense
Pseudolarix kaempferi
Sorbus americana
— aucuparia

Autumn Color—Yellowish to Bronze

Castanea dentata—	Fagus grandifolia
yellow to brown	Fagus sylvatica
Carya species—	Magnolia stellata
yellow to brown	Quercus imbricaria

1 1 1

Arboreta and Their Relation to the Community and Individual

(Continued from Page 4)

an advisory entomologist and plant pathologist could be appointed by the University to handle these problems. At the present time many of them have to be referred to the Experiment Station of the State College at Puyallup, which is more concerned with fruit crops than with ornamental plants.

Other common questions brought to us include methods of breaking up and treating new ground, the moving of large specimens, pruning, application of fertilizers, propagation, sources of supply for new or unusual plants, and many more. Some problems are referred to us by other horticultural advisers, especially of the newspapers or radio—all clear evidence that much information is needed on these and kindred subjects here in the Northwest, and strengthening our belief that this arboretum has a very definite place to fill, not only in its own community which gave it birth some thirteen years ago, but also over a very much wider and gradually extending area in which its capacity and possibilities are becoming known.

In conclusion I may perhaps sum up by saying that a live arboretum can:—

1. Serve as a large-scale test garden of trees and shrubs for its own and similar climates.
2. Disperse information by various means both to groups and individuals who require it.
3. By good example and practice, and the introduction of new or better plants, improve the standard of gardening both locally and elsewhere.
4. Bring to its citizens and visitors not only a living museum for study and ap-

preciation, but also a place of mental and physical relaxation in natural and peaceful surroundings.

If an arboretum does all this, or attempts to do it, then it deserves well of all who enjoy or share in those things.

1 1 1

List of Plant Names—Continued

(Continued from Page 37)

<i>bilobus</i>	two lobed
<i>binatus</i>	twin
<i>binervatus</i>	two nerved
<i>bipetalus</i>	two petaled
<i>bipinnatifidus</i>	twice pinnately cut
<i>bipinnatus</i>	twice pinnate
<i>bipunctatus</i>	two spotted
<i>bisectus</i>	cut in two parts
<i>biserratus</i>	twice toothed
<i>bistortus</i>	twice twisted
<i>bisulcatus</i>	two grooved
<i>bivalvus</i>	two valved
<i>bivelatum</i>	twice covered
<i>Bixa</i>	South American name
<i>blandus</i>	bland, mild
<i>Blandfordia</i>	after Geo. Marquis of Blandford
<i>Blechnum</i>	Gr. name for some fern
<i>blephariglottis</i>	fringed, tongued
<i>blepharocalyx</i>	with a fringed calyx
<i>Bletia</i>	after Louis Blet, Spanish botanist
<i>Bletilla</i>	diminutive of <i>Bletia</i>

<i>Bloomeria</i>	after Dr. G. H. Bloomer
<i>Blumenbachia</i>	after J. F. Blumenbach, professor
<i>Bocconia</i>	after Dr. Paolo Bocconi, Sicilian botanist
<i>Bodinieri</i>	after Bodinier, a French missionary
<i>Boehmeria</i>	after G. H. Boehmer, German botanist
<i>Bolandra</i>	after H. N. Bolander, California botanist
<i>Boltonia</i>	after James Bolton, English botanist
<i>Bomarea</i>	after J. C. W. de Bomare, French botanist
<i>Bombax</i>	Gr. name for raw silk
<i>bonus</i>	good
<i>Bonvalotii</i>	after Gabriel Bonvalot
<i>Boothii</i>	after F. H. Booth
<i>borbonicus</i>	of Bourbonne, France
<i>Boronia</i>	after Francis Borone, Italian
<i>Bougainvillea</i>	after de Bougainville
<i>Boussingaultia</i>	after J. B. Boussingault
<i>Bouvardia</i>	after Charles Bouvard, physician to Louis XIII
<i>Bowkeria</i>	after Henry Bowker and sister
<i>Boykinia</i>	after Dr. Boykin of Georgia
<i>brachiatus</i>	branched at right angles

1 1 1

Mr. G. S. Thomas' article in the Summer 1949 issue . . . page 24, top of right column shows "Fruhlingsgold" instead of "Fruhlingszauber," as the *Rosa spinosissima* hybrid producing a second flowering in September.

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Behavior of Plants from Foreign Countries

(Continued from Page 26)

Trees for Heavy Soil

Botanical Name	Common Name	Condition and Injury May, 1949
Libocedrus decurrens	California Incense Cedar	O.K.
Lithocarpus densiflora	Tanoak	O.K.

Trees for Heavy Loam

Abies Pinsapo	Spanish Fir	O.K.
Acacia melanoxylon	Blackwood Acacia	top killed
Ailanthus Giralddii	Girald Ailanthus	O.K.
Albizzia Julibrissin	Silk Tree Albizzia	O.K.
Castanea crenata	Japanese Chestnut	O.K.
Castanea sativa	Spanish or European Chestnut	O.K.
Castanopsis chrysophylla	Giant Evergreen Chinkapin	O.K.
Ceanothus thyrsiflorus	Blue Blossom Ceanothus (shrub)	O.K.
Cercis occidentalis	California Redbud	O.K.
Cedrus libani	Cedar of Lebanon	O.K.
Cinnamomum Camphora	Camphor Tree	leaves and twigs killed
Cleyera japonica tricolor (Eurya ochnacea)	Japanese Cleyera (shrub)	O.K.
Cordyline stricta	Australian Dracena	O.K.
Cornus controversa	Giant Dogwood	O.K.
Cornus Mas	Cherry Dogwood	O.K.
Cornus officinalis	Japanese Cornel Dogwood	O.K.
Diospyros Kaki	Kaki Persimmon	O.K.
Distylium racemosum	Chinese Distylium	O.K.
Eriobotrya japonica	Japanese Loquat	O.K.
Eucalyptus amygdalina	Peppermint Eucalyptus	leaves and twigs killed
Eucalyptus MacArthuri	MacArthur Eucalyptus	leaves killed
Eucalyptus rostrata	Red Gum Eucalyptus	leaves killed
Eucalyptus viminalis	Manna Gum Eucalyptus	O.K.
Ficus Carica Kadota	Fig	O.K.
Ficus var. Labarula	Fig	O.K.
Ilex vomitoria	Yaupon	O.K.
Juglans californica	California Black Walnut	O.K.
Juglans cinerea	Butternut	O.K.
Myrica cerifera	Southern Wax Myrtle	O.K.
Nerium Oleander	Common Oleander	leaves and twigs killed
Pinus Cembra	Swiss Stone Pine	O.K.
Pittosporum Tobira	Tobira Pittosporum	O.K.
Podocarpus macrophylla	Yue Podocarpus	O.K.
Poinciana Gilliesii	Paradise Poinciana	top injured
Prunus Padus	European Bird Cherry	O.K.
Quercus agrifolia	California Live Oak	O.K.
Querus chrysolepis	Canyon Live Oak	O.K.
Querus Suber	Cork Oak	O.K.
Quercus virginiana	Live Oak	O.K.
Retama sp.	Retama	O.K.
Sapindus Mukorossi	Chinese Soapberry	O.K.
Sequoia gigantea (Sequoiadendron giganteum)	Giant Sequoia	O.K.
Sequoia sempervirens	Redwood	O.K.
Styrax japonica	Japanese Snowball	O.K.
Umbellularia californica	California Laurel	O.K.

Trees and Shrubs for Light Loam

Arctostaphylos glauca	Bigberry Manzanita	O.K.
Fraxinus excelsior	European Ash	O.K.
Fraxinus Ornus	Flowering Ash	O.K.
Fraxinus syriaca	Syrian Ash	O.K.
Lagerstroemia indica	Common Grape Myrtle	O.K.
Laurus nobilis	Grecian Laurel (True Bay)	O.K.
Melia Azedarach	China berry	O.K.
Myrtus communis	True Myrtle	top injured
Olea europaea	Common Olive	O.K.
Phellodendron chinense	Chinese Cork Tree	O.K.
Phellodendron japonicum	Japanese Cork Tree	O.K.
Prinsepia sinensis	Cherry Prinsepia	O.K.

Punica Granatum	Common Pomegranate	O.K.
Quillaja Saponaria	Soapbark Tree	top killed
Rhamnus Alaternus	Italian Buckthorn	O.K.
Rosmarinus officinalis	Rosemary	O.K.
Sophora japonica	Japanese Pagoda Tree	O.K.
Sophora tetraptera microphylla	Little-Leaf Fourwing Sophora	O.K.
Taxodium ascendens	Pond Bald Cypress	O.K.
Trachycarpus excelsa	Windmill Palm	O.K.
Vitex Agnus-castus	Lilac Chastetree	O.K.
Vitex Negundo incisa	Cutleaf Shastetree	twigs killed
Zizyphus Jujuba	Common Jujube	O.K.

*For Soil Rich in Humus and Partially
Shaded in the Afternoon*

Camellia sinensis	Common Tea	O.K.
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*Here are More Plants not Listed Before
Which Also Came Through the Winter
and Are in Good Condition*

Buddleja globosa	Globe Buddleja	O.K.
Cornus capitata	Evergreen Dogwood	O.K.
Eucalyptus gigantea	Delegate Eucalyptus	O.K.
Eucalyptus globulus	Tasmania Blue Gum	leaves and young twigs killed
Eucalyptus pulverulenta	Dollarleaf Eucalyptus	O.K.
Ilex glabra	Inkberry Holly	O.K.

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Published by the
Arboretum Foundation
University of Washington
Arboretum
Seattle 5, Washington

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